AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 80 Number 9

CONTENTS

Features in the News

C. A. MUSSELMAN, Pres.; J. S. HILDRETH, Vice-Pres. and Manager, Automotive Division; G. C. BUZBY, Vice-Pres.

OFFICES

Philadelphia—Chestnut & 56th Sts., Phone Sherwood 1424
New York—239 W. 39th St., Phone Pennsylvania 6-1100. Chicago—Room 916, London Guarantee & Accident Bldg., Phone Franklin 4243. Detroit—1015 Stephenson Bldg., Phone Madison 2090. Cleveland—609 Guardian Bldg., Phone Cherry 4188. Washington—1061 National Press Bldg., Phone District 6877. San Francisco—444 Market St., Room 305, Phone Garfield 6788. Long Beach, Cal.—1595 Pacific Ave., Phone Long Beach 613-238.
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CHILTON COMPANY
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AUTOMOTIVE INDUSTRIES

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March 4, 1939

March Production Heads for 350,000

Industry Confident of Normal Seasonal Increases in Sales

Although car and truck production for the week ending March 4 was only slightly higher than during the last full week in February, succeeding weeks are expected to show the results of increased schedules following the normal seasonal pickup in sales that the industry is confidently expecting.

A mid-week survey of factory schedules indicated that manufacturers expected to turn out a few hundred units over 75,000 cars and trucks as compared with a revised estimate of approximately 74,000 during the preceding week when labor disturbances in the plant of one major producer affected production adversely.

On the basis of the current week's record it is estimated that February production totaled approximately 320,000 cars and trucks. The first two months of 1939 have accounted for a total production of approximately 675,000 cars and trucks so that March totals need only reach 325,000 units to provide the industry with its second successive quarter totaling more than one million units. Although tentative March schedules were not available from all sources, anticipated increases —based on estimates of several major producers—indicate that March production should at least reach 350,000.

Buick, which built 20,000 cars in January and 19,650 in February, has already announced a projected schedule calling for 26,600 units in March. This producer began March by returning to a five-day 40-hr. week, from the 32-hr. week in effect during January and February. Several other manufacturers have schedules calling for increases ranging from 15 to 30 per cent.

General Motors divisions, maintaining a consistent pace, accounted for approximately 33,000 cars and trucks during the current week. Chrysler divisions and Ford divisions were responsible for approximately 17,750 units each with the major part of the balance coming from Packard, Hudson, Nash and Studebaker.—J. A. L.

Acme

First Test Hop Completed

Two views of the new Douglas DC-5 plane which recently completed its first test flight at the Los Angeles municipal airport, California. The plane is capable of carrying 16 persons and a crew of three at a top speed of 248 m.p.h. Outstanding innovations are the retractible nosewheel and the tricycle landing gear.

Hopkins Invites Industry Spokesmen to Conference

Asked to Assist in Planning for the Sixteenth Decennial Census of 1940

Secretary of Commerce Harry L. Hopkins has invited more than 100 representatives of business and industry, including spokesmen for the Automobile Manufacturers Association, The Rubber Manufacturers Association, and the National Association of Manufacturers and the United States Chamber of Commerce, to attend a series of conferences at the Commerce Department to assist in drawing up preliminary plans for conducting the 16th Decennial Census of 1940.

Among those invited to attend sessions on March 10 and 11, when the census of manufacturers will be up for consideration are the following:

Pyke Johnson, vice-president, Automobile Manufacturers Association, Washington; C. W. Halligan, assistant secretary, The Rubber Manufacturers Association, New York City; Noel Sargent, secretary, National Association of Manufacturers, New York City; Thomas W. Howard, Department of Manufacture, Chamber of Commerce of the United States.

Among the participants expected to attend on March 14 and 15, when the

(*Turn to page* 296, *please*)

Second Quarter Steel Operations Expected to Attain 60% Capacity

Current Backwardness of Buying Attributed To Heavy Purchases During 1938 "Price War"

Fulfillment of predictions that during the second quarter of the year the steel industry will attain 60 per cent employment of its capacity depends largely upon the volume of flat rolled steel orders expected from automobile manufacturers in March. The month just begun, in the ordinary course of the steel market's routine, should bring out commitments and, in part, specifications for March-April body and fender stock requirements of the automobile manufacturers.

Groping for an explanation of the backwardness of buying in the past few weeks, some market observers have reached the conclusion that a good deal more steel, than generally thought, was ordered during the short-lived "price war" of last year, and that some of the recent deliveries were still part of this old business. Be this as it may, the slow pace of buying in recent weeks has been more generally ascribed to reluctance to anticipating requirements any more than is absolutely necessary and to the absence of any incentive to modify this policy. With the labor situation somewhat less of a problem and the general economic outlook a shade brighter, steel producers look for a gradual loosening up of automotive business from now on.

Granting of a temporary injunction to the smaller Eastern steel producers in their battle against a 62½ cents an hour minimum wage rate under the Walsh-Healey Act together with the Supreme Court decision against "sit-in" strikes caused the steel market to feel more optimistic regarding the outlook for industrial peace in the industry. The better feeling was reflected in the 4 per cent rise this week in employed ingot capacity, which according to the American Iron and Steel Institute now stands at 55.8 per cent.

The International Tin Committee meets in London, March 22, and in view of the dragging of sales into consumption, some interests would have them trim the export quota further. An explanation why so little is heard these days of Bolivian tin, which at one time entered world consumption to the extent of 30,000 tons a year, comes from London. Exporters are obliged to turn from 45 to 60 per cent of the foreign exchange they receive for their tin, over to the Bolivian government. The market for spot Straits tin opened this week slightly higher at 45.70 cents, and on Tuesday advanced to 45.95 cents, which represents a rise of approximately $12 a ton over the quotation of the day before Washington's birthday.

The triangular price set up in the copper market continues. Producers quote spot electrolytic at 11¼ cents, at which price level their sales consist primarily of transactions with their fabricating subsidiaries. The latter, therefore, price the cost of copper in brass and other alloys at 11¼ cents, while in the outside market some sales were made at 10½ cents. The export price on Tuesday stood at 10.02½ cents.

Amid insistent demand, prices for lead ruled firm, buyers generally wanting to cover their nearby needs before an advance would be announced.—W. C. H.

Atlas Annual Meeting To be Held March 17

The annual meeting of Atlas Imperial Diesel Engine Co., San Francisco, will be held March 17. Directors nominated by the management, together with the stockholders are Worthen Bradley, S. P. Eastman, Gustav Epstein, Phillip J. Fay, Russell P. Hastings, F. H. Kilberry, Clay Miller, A. N. Nathan and M. E. Wright.

Oldsmobile Reports Improved Retail Sales

Oldsmobile retail sales for the second 10 days of February registered a gain of 44 per cent over sales for the same period last year. Total retail sales for the period of Feb. 10 to 20 were 2893 units compared to 2013 for the same period in 1938.

Used car sales likewise continued at a strong pace with approximately 13,000 units being sold during the second 10 days of February. Used car stocks in the hands of the 3500 Oldsmobile dealers were more than 6000 units less than at this time a year ago.

Or Else . . .

From the office of the American Commercial Attache in Tokyo comes word that some time in March or April gasoline allotments for private cars in Japan will be discontinued. Owners will be left with the choice of installing charcoal burning or other substitute fuel equipment, or selling their vehicles to commercial organizations or the military forces, or of placing the cars in storage until such time as the "present emergency ends."

Letters

Editor, AUTOMOTIVE INDUSTRIES:

The use of iron for road surfacing has received mention on several occasions, and the School of Mines of the University of Minnesota has done much research on this problem. As a curious onlooker with an interest in the practical application of the teaching of high school physics, the writer with some students performed some tests on the experimental iron pavement stretch

Passenger Car Production by Wholesale Price Classes
(U. S. and Canada)

	January			Per Cent of Total	
	1939	1938	Per Cent Change	1939	1938
Under $750	270,208	149,993	+ 80.0	92.72	88.81
$751-$1000	17,880	15,803	+ 13.1	6.13	9.36
$1001-$1500	2,767	2,417	+ 14.6	.95	1.43
$1501-$2000	289	393	− 26.4	.10	.23
$2001-$3000	264	230	+ 15.0	.09	.14
$3001 and over	36	54	− 33.3	.01	.03
Total	291,444	168,890	+ 72.0	100.00	100.00

Truck Production by Capacities
(U. S. and Canada)

	January			Per Cent of Total	
	1939	1938	Per Cent Change	1939	1938
1½ Tons and less	58,047	55,244	+ 5.0	92.88	94.82
2 to 3 Tons	2,609	1,401	+ 86.2	4.17	2.40
3½ Tons and over	881	895	− 1.6	1.41	1.54
Special and buses	965	722	+ 33.6	1.54	1.24
Total	62,502	58,262	+ 7.3	100.00	100.00

found on the University of Minnesota Campus.

Using a Tapley decelerometer, we were very surprised to find that the iron pavement afforded stopping power ranging over 100 per cent (more than 32.2 ft. per sec. deceleration). This was in dry weather when the best test results on concrete pavement ran around 92 per cent. These results are for a speed of 20 m.p.h. These results check fairly well with the laboratory findings, according to Dr. Elmo Hanson, who is connected with the research project. Dr. Hanson points out the disadvantage of a large velocity effect. That is, the stopping power of the threaded iron pavement drops off rapidly with an increase in speed.

The test was repeated in wet weather, and we found another drawback in the effect of surface moisture. The pavement is extremely susceptible to wet weather (a drawback found in certain asphaltic surfaces), the stopping power dropping to about 30-40 per cent. Under similar conditions, wet concrete pavement had a stopping power of 60-70 per cent as indicated by our means of testing.

It appears that some form of surface treatment of the iron pavement blocks will be necessary to overcome the velocity and wet-weather effects to any great extent. One solution that comes to my mind is the possibility of incorporating a finely crushed sinter or slag into the surface. This could be done possibly by taking advantage of the difference in the specific gravities of the molten iron and the sinter. In other words, the sinter could be floated to the top of the side-fed mold. This would result in a porous, gritty surface bonded to the iron of the pavement block. A tread design may also be used as in the type of pavement found in the experimental strip.

The vast stores of low-grade iron ore found in Minnesota make this an important research problem for this State and for any region lacking economical paving materials.

Incidentally, we found an increase of from 4 to 9 per cent in stopping power on gravel or concrete pavement by applying the brakes with the car left in gear.

Frans Vaurio,
Instructor in Physics,
University of Minnesota.

United Specialties Lost $38,240 in '38

United Specialties Co. in its annual statement to stockholders reports a loss of $38,240 for 1938. It is pointed out, however, that a previous report for nine months' operations showed a loss of $73,865 which profitable operations in the last quarter reduced by $35,625. Profits in 1937 amounted to $173,967 after deducting the earnings of the subsidiaries from Jan. 1, 1937, to the dates of their acquisition by this corporation.

All-Weather Test Tunnel

An engineer at the control of the new weather tunnel at the Ford Motor Co. engineering laboratory can direct the full impact of a 70-mile sleet storm directly at an automobile running at a speed equivalent to 85 m.p.h. The tunnel is 124 ft. long, 35 ft. wide and 14 ft. high with an air passage of 10 ft. by 10 ft. Rear wheels of vehicle under test are placed on a tread-mill connected to a dynamometer to measure engine output.

In addition to heating and refrigerating systems, there is a cold chamber in which 40-below temperature may be created. A 400 hp. engine drives a 10-ft. three-bladed propeller to create wind velocities up to 85 m.p.h. and dust or sand may be sent into the tunnel through a jet in the floor ahead of the car. Water pipes produce anything from a light fog to a cloudburst. Findings in the new weather laboratory are correlated with those made on the test track.

Industrial Activity Generally Stable; Fisher's Index at 80.0

An Exclusive and Regular Weekly Feature Written by the Guarantee Trust Co., N. Y.

Relative stability of general industrial activity continued last week. For the preceding week, ended Feb. 18, the *Journal of Commerce* index of business registered a gain of one fractional point to 84.8, as against 69.6 a year ago.

Reported trends in retail trade last week indicated a leveling tendency following a rather general expansion of sales in the preceding week. For the week ended Feb. 18, department store sales reported to the Board of Governors of the Federal Reserve System registered a gain of 2 per cent over the corresponding 1938 level, as against an equal margin below last year's trade recorded in the preceding week.

A further decline in the output of electricity by the light and power industry in the week ended Feb. 18 slightly exceeded the usual seasonal reduction; the margin above the comparable 1938 production was 9.2 per cent, as against 10.5 per cent in the preceding week.

Railway freight loadings in the same week totaled 580,071 cars, or 153 cars more than in the preceding week; they exceeded the loadings a year ago by 8.2 per cent.

Average daily production of crude oil in the week ended Feb. 18 was 3,324,300 barrels, or 40,600 barrels more than the average in the week before. Current daily requirements, as computed by the U. S. Department of the Interior, are 3,220,000 barrels.

The average daily production of soft coal in the same period was 1,403,000 tons, as compared with 1,424,000 tons in the preceding week and 1,083,000 tons a year ago.

Engineering construction awards in the week ended Feb. 23 totaled $60,863,-

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N.A.M. Officers

S. Clay Williams, chairman of the Board, R. J. Reynolds Tobacco Co., and Paul Garrett, director of Public Relations of General Motors, chairman and vice-chairman respectively, of the National Association of Manufacturers 1939 Committee on Public Relations, snapped at the N.A.M.'s first Board of Directors meeting this year.

Fate of UAW Factions Hinges On Outcome of Two Conventions

Expected to Provide Clearer Picture of Destiny of Organized Automotive Labor

The outcome of the first two "official" UAW conventions scheduled to be held this month—that of the Homer Martin faction opening in Detroit on March 4—is expected to provide a much clearer picture of the immediate future of organized labor in the automotive industry than has been available in recent months during the contest for supremacy between the contending factions.

First of all the Martin convention will show the relative strength of the contending groups. If Martin's following is as strong as its leaders claim, there is every likelihood that the industry will face a period of dual unionism and continued uncertainty over the status of present contracts which may have to be clarified by NLRB elections. Although the convention will vote on continued affiliation with the CIO, the fact that John L. Lewis has threatened excommunication of every local sending delegates to the convention apparently leaves them no choice but to continue outside the CIO, either as an independent union or under the possible leadership of the AF of L.

Of course, if the Martin contingent fails to show its claimed strength there is also the possibility that a good part of his support will join the CIO-blessed faction in the interest of a single union within the industry.

Martin's personal future in the automotive labor movement also is largely dependent upon the outcome of the convention. The CIO faction of the UAW has announced that its executive board will open an impeachment trial in Cleveland on March 11, at which the charges under which Martin was suspended will be aired. The trial will be held whether Martin appears to defend himself or not, it has been announced.

The continued internal struggle in the UAW appears to have overshadowed any reaction to the decision handed down by the U. S. Supreme Court definitely upholding the illegality of sitdown strikes. No public statements on the decision have been made either by industry leaders or labor leaders. However a UAW sitdown strike in the aircraft plant of Bendix Products Corp. in South Bend, which was in progress at the time the decision was announced, was called off by union leaders because of the court's decision that such strikes are illegal.

Reo Receivership Action Dismissed

Receivership proceedings filed in the Lansing circuit court by a group of 20 stockholders of the Reo Motor Car Co., were dismissed on Feb. 28 by voluntary action of the plaintffs. The suit had been filed prior to the proceedings for reorganization in federal court which then took precedence.

It has also been announced that a group of creditors and stockholders will seek a modification of the federal court order to permit early termination of the company's trusteeship. The court was to be asked to instruct the receiver, Theodore I. Fry, to investigate possibilities of raising funds immediately to pay creditors so that the trusteeship can be ended and the company returned to the new management without the need for further reorganization.

Curtiss-Wright's New Transport Described

G. A. Page, Jr., chief engineer, St. Louis airplane division, Curtiss-Wright Corp., described to members of Detroit Section, SAE, this week, the development of the new C-W 20 transport ship which is now in process of construction. This ship has accommodations for 30 passengers and 6000 lb. of baggage payload. It is completely streamlined to flush type joints and rivets, flush windows. Designed for sub-stratosphere operation, it incorporates a pressure cabin designed with structural features and internal air pressure boost for a maximum altitude of 20,000 feet.

The ship is powered by two, double-row, 14 cylinder Wright engines, rated 1350 hp., with supercharging at two points, developing 1600 hp., momentarily at take-off. The engines are equipped with the latest type non-icing carburetors. Each engine is fitted with a Curtiss-Wright electrically-operated variable pitch propeller, permitting full feathering of the propeller in the event of engine failure.

Wing span is 108 ft. The ship will cruise at 240 m.p.h. at an altitude of 12,000 ft. Fuselage design is of skin stressed type, using Alclad formed sheets and rolled structural members. Acoustic and thermal insulation developed for the ship by Sperry, provides a noise level of around 60 db, cruising, which compares favorably with good passenger car practice.

Houdaille Profit In '38 Totaled $588,230

Houdaille-Hershey Corp. and its subsidiary companies report for the year ended Dec. 31, 1938, net consolidated profit of $588,230.43 after all charges including depreciation, provision for Federal taxes and earnings applicable to minority interests.

These earnings are equivalent to $3.38 per share on 174,000 shares of Class A stock outstanding at Dec. 31, 1938. After allowing for the regular annual dividend requirement of $2.50 per share on the Class A stock, these earnings amounted to approximately 20 cents per share on 785,057 shares of Class B stock outstanding at Dec. 31, 1938, and compares with earnings of $2,117,441.60 or $2.14 per share on the Class B stock reported for the year ended Dec. 31, 1937.

Plan to Stiffen Walsh-Healey Law Held Threat to U.S. Defense

Labor Department Proposal to Tighten Existing Restrictions Meeting Congressional Opposition

The Labor Department's move to broaden the Walsh-Healey Public Contracts Act, under which the Government lays down minimum labor standards for firms doing Government business, is meeting some opposition by Congressional members who are reluctant to tighten the law at a time when they feel it should be relaxed in the interest of national defense.

Many of these members have not expressed themselves openly on the subject but they reflect the common viewpoint in War and Navy Departments that making it more difficult for firms to sell supplies to the Government by tightening existing restrictions is far from being conducive to a systematic and efficient program of rearming. Both War and Navy Departments have gone on record as being against broadening of the Walsh-Healey law and it is recalled that these departments have protested against the move ever since the original Walsh-Healey bill was first introduced in the 74th Congress.

The latest evidence that some Congressional members consider a broadening of the law somewhat of a threat to the national defense program is seen in the action of the Senate Military Affairs Committee which last week wrote into the national defense bill a provision excluding the proposed $34,500,000 educational orders program from the jurisdiction of the Labor Department's Public Contracts Division. The department, zealous of its functions of requiring industry to adhere to its prescribed labor standards, immediately dispatched a lieutenant to Capitol Hill to protest against any move which would curtail its activities.

That the CIO is back of the move to kill the exemption of educational orders from the provisions of the Walsh-Healey Act was revealed Monday when CIO Chairman John L. Lewis was assured by Senate Majority Leader Barkley of Administration support to strike out the proposed amendment. Senator Barkley also referred Mr. Lewis to Senator Elbert D. Thomas, Democrat, of Utah, a member of the Military Affairs Committee and chairman of the Committee on Education and Labor, who has announced opposition to the proposed exemption.

Carrying out the primary features of President Roosevelt's national defense recommendations, including a provision calling for 5000 combat planes, an authorization of $23,750,000 for the defenses of the Panama Canal and $34,500,000 for educational orders, the measure passed the House on Feb. 15, and was referred to the Senate Military Affairs Committee where members inserted the provision to which the Labor Department has taken vigorous exception. It was reported out favorably by the Senate committee on Feb. 22.

The bill provides that the authorization shall be available for expenditures for "production studies, factory plans, and other production data and the stor-

(*Turn to page 297, please*)

Canadian Car Sales Slumped in January

There were 5930 new motor vehicles retailed in Canada for $6,616,269 in January compared with 8553 for $9,475,257 in December and 6832 at $7,686,130 in the corresponding month last year. During the month there were 6363 new and used vehicles financed to the extent of $2,733,980 against 8910 for $3,961,589 in December and 6726 for $3,205,685 in January last year.

The following table shows the retail value of sales by months, and comparisons with a year ago.

	1938	1937	% Chge.
January	7,686,130	8,846,034	—13.1
February	7,875,152	9,234,073	—14.7
March	13,504,044	16,723,345	—19.3
April	23,070,476	21,112,715	+ 9.3
May	19,991,349	21,453,442	— 6.8
June	12,992,722	18,244,997	—28.8
July	9,215,074	12,810,854	—28.1
August	8,018,020	9,521,833	—15.8
September	6,566,378	6,638,629	— 1.1
October	7,161,483	6,552,261	+ 9.3
November	9,725,496	8,989,170	+ 8.2
December	9,475,257	9,043,174	+ 1.9
12 Months	135,281,581	149,170,527	— 9.3
	1939	1938	% Chge.
January	6,616,269	7,686,130	—10.8

Chevrolet's February Sales Ahead of '38 Mark

New cars and trucks sold by Chevrolet dealers in the second 10 days of February totaled 16,551, making a total of 33,651 units sold in the first 20 days of the month, as against 26,878 in the same period last year. This is an increase of 25.2 per cent over the corresponding 1938 period.

Continental Aeronautic Corp. Starts Production

Continental Aeronautic Corp., established last December for the manufacture of airplane instruments and parts, has announced the start of production at its recently acquired plant in Burbank, Calif. First to get under way was the sheet metal department. Other departments are expected to follow shortly, as soon as tools and machinery, now being delivered, are installed.

Rapid progress has been made in modernizing the plant which occupies 23 acres in the Burbank industrial district, and comprises approximately four acres of floor space. This program is now practically completed.

The company has announced the election of Charles H. Shattuck as director and secretary and treasurer, succeeding R. M. Allan, resigned.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity
(Week Ending March 4)

BUSES Several important inquiries have been made by bus line operators along the Atlantic seaboard. Recent purchase of Diesel-powered buses by Burlington Transportation, 21 units seating 28 passengers each and costing and $500,000 for Chicago-to-West Coast service, seems to have stimulated interest in this type of powerplant for bus service.

TRUCKS Evidences of improvement attributed to a general betterment of conditions especially with larger buyers. One company which has been more or less pessimistic for several months states "beginning to see some daylight and expect to step up production during March."

TRACTORS No change from last week. Most concerns claim that present production is fairly well ahead of sales but sudden buying tendencies on the part of farmers would cause temporary embarrassment to fulfill orders for certain models.

AUTOMOBILES Production this week exceeded 75,000 by a few hundred units. Schedules probably will be increased steadily from now on if the industry's expectation for a normal seasonal pickup in sales is fulfilled.

MARINE ENGINES Business has improved in last two weeks for several companies. One states that "1939 may yet prove to be very satisfactory from production standpoint." A manufacturer of low-horsepower inboard engines designed to replace outboards reports very encouraging sales.

AIRCRAFT ENGINES Earlier estimates of 1939 output are being revised upward. Private and commercial orders are showing gains, export business continues good, and prospective Army and Navy buying is counted on to continue present heavy production schedules.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

Will AFL and CIO Bury the Hatchet?

Peace Between Labor Organizations Seems To Be an Attainable but Distant Goal

Ultimately but not now seems to be the prevailing view regarding prospects of peace between AFL and CIO. Differences between the two labor organizations and their respective heads, William Green and John L. Lewis, are held to be so deep-seated that doubt exists that, despite the renewed urgent appeal of President Roosevelt, they can reach an early agreement to bury the hatchet and unite into a single labor front. Not the least of the difficulties is the dominant character of the two labor chiefs, each of whom definitely would be reluctant to become subordinate to the other.

In previous moves toward peace, Mr. Lewis has offered to resign as leader of the CIO if Mr. Green would resign as head of the AFL. This possibly was only a gesture or a strategic move on the part of Mr. Lewis which met with expected silence by Mr. Green, equivalent to a refusal to accept the offer. Certainly there is no expectation that Mr. Green would today voluntarily step out as president of the AFL even at the price of peace. There is even less reason at present than in the past for his doing so because AFL stock has been rising while CIO stock is on the decline, though its standing has not fallen to anything like the degree some of its opponents effect to believe. As for Mr. Lewis' resigning in the absence of like action by Mr. Green, there is not the slightest discernible prospect, and the possibility of his serving under Mr. Green apparently is an improbability.

It is not seen how the two could hold positions of equal rank in the labor movement. In accepting President Roosevelt's proposal, Mr. Green insisted that "the preservation of the structure of the AFL and the preservation of its democratic principles are of transcendent importance and cannot be compromised or made the subject-matter of negotiation." The assumption is that Mr. Green is demanding retention of the AFL's craft unionism principle, but at the same time it was explained many craft unions have been transformed into an industrial character, although maintaining their "structures" as craft unions. Mr. Lewis, it has been intimated, might approach peace negotiations only on the contingency that CIO unions be accepted as a whole under their present plan of organization by the AFL pursuant to a merger of the two parent bodies. The AFL position apparently indicates it would not agree to such a device.

In accepting the President's suggestion for a peace conference, Mr. Lewis named a CIO committee of three. This committee consists of Lewis, Phil Murray, head of the SWOC, and Sidney Hillman, president of the Amalgamated Clothing Workers Union.

Despite these and fundamental organizational obstacles, there is a belief that in some manner, possibly after long and difficult negotiations, peace may be established. But if brought about at all, it is a question whether it can be done as quickly as is eagerly desired by the Administration, which sees its necessity if political success in 1940 is achieved. The proposed peace negotiations, long under discussion between high ranking Government officials and labor leaders, was openly espoused by Secretary of Commerce Hopkins in his address at Des Moines last Friday night, timed nicely with letters from the President to Mr. Green and Mr. Lewis, received the day following. Mr. Hopkins, in the role of chief peace bearer, is said to be planning to make recommendations for changes in the National Labor Relations Act.

Meantime, in order that no fly might get into the ointment of peace, Senator Thomas, Democrat of Utah, chairman of the Committee on Education and Labor, announced indefinite postponement of hearings on proposed amendments to the National Labor Relations Act. The AFL had proposed sweeping changes in the act, while the CIO has strongly opposed any amendment. Mr. Green has served notice on Senator Thomas that the postponement will not be allowed to defeat AFL's demands for amendments to the act. Sentiment in the ranks of AFL, it is said, has persuaded it to concentrate on two changes. One would compel recognition of the craft union as a unit for collective bargaining. The other would

(Turn to page 298, please)

Revival Meeting

Three hundred owners of Cord cars in the Chicago area met last week to organize the Cord Owners' Club. They elected D. Cameron Peck as president, C. E. Emmer, vice-president, and Glen Thompson, secretary. "Purpose of the club," said Mr. Peck, "will be to seek to induce E. L. Cord to revive production of this car."

Sit-Downs Are Ruled Illegal

Supreme Court Holds That They Are Not The Exercise of the "Right to Strike"

Ruling directly on the controversial sitdown strike, the Supreme Court on Feb. 27 held that the strike is not the exercise of "the right to strike" given under the Wagner Act and that it is "illegal in its inception and prosecution."

In a long-awaited decision involving the Fansteel Metallurgical Corp., of South Chicago, Ill., the court in a 5 to 2 decision read by Chief Justice Charles Evans Hughes, said that the NLRB does not have authority to compel the reinstatement of workers discharged for participation in a sitdown strike.

Affirming a seventh circuit court of appeals decision which invalidated a labor board order and called upon the company to reinstate a group of workers who participated in a sitdown strike in February, 1937, the court said that "when employes resorted to that sort of compulsion they took a position outside the protection of the statute and accepted the risk of the termination of their employment upon grounds aside from the exercise of the legal rights which the statute was designed to conserve."

Hughes held that "the important point is that respondent stood absolved by the conduct of those engaged in the sitdown from any duty to reemploy them, but respondent was nevertheless free to consider the exigencies of its business and to offer reemployment if it comes."

"The employes had the right to strike but they had no license to commit acts of violence or to seize their employers' plants," the Chief Justice said in the opinion. "But in its legal aspect the ousting of the owner from lawful possession is not essentially different from an assault upon the officers of an employing company, or the seizure and conversion of its goods, or the despoiling of its property or other unlawful acts in order to force compliance with demands."

On the same day the court also ruled on two other cases involving the NLRB and in both the labor board was the loser. It affirmed a seventh circuit court of appeals decision which had set aside an NLRB order against the Columbian Enameling & Stamping Co., of Terre Haute, Ind., and it took similar action with respect to a sixth circuit court of appeals decision invalidating an NLRB cease and desist order

against the Sands Mfg. Co., Cleveland.

In the Columbian Enameling case, the NLRB had ordered the company to reinstate a group of workers who went on strike March, 1935—before the Wagner Act became law—and to cease and desist from certain other alleged unfair labor practices. The circuit court had invalidated the order solely on the grounds that the workers had struck in violation of the no-strike agreement. Justice Stone, in the majority opinion, said the court could find no substantial evidence that the company had refused to bargain with the union.

He added that in the eight months before the strike, the company negotiated agreements with the union but that these were broken by the strike itself, which was accompanied by picketing, violence and destruction of property, ending in a proclamation of martial law July 22.

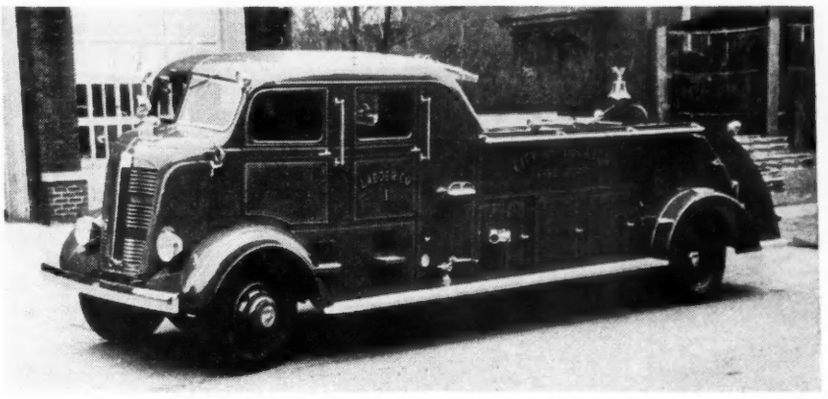
In the case involving the Sands Mfg. Co., the circuit court had set aside the NLRB order on the grounds that the board's findings, on which the order was based, were directly contrary to the evidence in the case. The board had found that the company had discriminatorily locked out members of the union—the Mechanical Educational Society of America—and had failed to bargain in good faith with the union. Associate Justice Roberts read the majority opinion, which said that the evidence in support of the board's finding that the strike resulted from unfair labor practices by the management "does not amount to a scintilla when considered in the light of respondent's long course of conduct in respect of union activities and in dealing freely and candidly with the union involved."

The controversy started back in June, 1935, when the company signed a contract with MESA. After a lull in plant operations, the company shut down the plant but continued to operate the machine shop. By mid-August the firm attempted to increase the number of machine-shop employes but the union intervened, insisting that "old" employes would have to be hired first before "new" ones were taken on. This controversy closed the shop until the company subsequently negotiated an agreement with the AFL machinists union and reopened the shop without employing members of the MESA union.

The union then picketed the plant and procured an order from the NLRB which charged the company with discrimination, lockouts, coercion, interference with self-organization and failure to bargain collectively.

Kelsey to Make Aircraft Wheels

Aircraft wheels of aluminum or magnesium together with brakes and axles, will be made in Canada by the Kelsey Wheel Co., Ltd., Windsor, Ont. These parts have in the past been imported.



Acme

Pride of Decatur, Ill.

Fire Chief Will Plant of Decatur, Ill., designed this unusual fire truck. Seven men ride in the cab, none on the outside. Equipment includes turret nozzle which feeds 1500 gal. of water per minute, 192 ft. of aluminum ladders, 250 ft. of fire hose, and a flood lighting system powered by a small gasoline motor driven generator carried inside the truck. The eight-ton unit was built at a cost of nearly $17,000.

Abstracts

In an article on "The New Glass Industry," Prof. P. Gilard of the University of Liege, Belgium, devotes a section to safety glass. He says the idea of producing a safety glass by incorporating a sheet of non-breakable material between two plates of glass is not new and dates back to 1905 when the Englishman Wood cemented two plates of glass to an intermediate sheet of celluloid. The idea was revived in 1909 by H. Benedictus and industrially exploited by the firm of Röhm & Haas and Dr. Walther Bauer who cemented or glued the glass plates together by non-saturated resins, thereby overcoming some of the difficulties experienced with celluloid, particularly the change in color of the intermediate layer on aging. Another method of solving the problem consists in rendering the glass harder and more shock-resistant. This effect is obtained by tempering the glass, and the product is known under the name of Securit.

The various forms of safety glass may be divided into the following classes:

1. Multiplex glass composed of two or more layers of glass which are cemented together by compositions of cellulose, synthetic resins, or similar material.
2. Armored glass, which is similar to the foregoing but composed of a considerable number of sheets, so that if it is hit by a bullet, only the outer layers will be affected. The bullet remains buried in the mass and does not penetrate the glass.
3. The hardened glass called Securit.
4. Wire glass in which a network of wire is incorporated in the glass itself.
5. Finally, synthetic glasses which in reality are organic compounds which possess many of the properties of glass, notably its transparence, and may be worked like the latter, but which, on the other hand, are more flexible and do not shatter like glass. These may be armored much more readily.—*Chimie & Industrie*, December.

Hudson Gets Patent On Braking System

The Hudson Motor Car Co. has been granted patent No. 2147955 covering the safety principles of hydraulic plus mechanical reserve brakes, described by the company as Hudson "Double-Safe" hydraulics since their development in 1936. Named in patent papers as the Baits patent, the claims cover an automobile braking system having hydraulically actuated mechanism and mechanically actuated mechanism for applying the same set of wheel brakes, both systems controlled and operated by the same brake foot pedal.

Motor Wheel Paid 73 Cents Per Share in '38

Motor Wheel Corp., Lansing, Mich., has reported for the year 1938 a net income after depreciation and taxes, of $621,779 or 73 cents per share as compared with $2.11 per share in the previous year.

Polk Estimates 24% Decline in February

Preliminary new car registration figures from the nation's principal cities covering the first 16 days of February indicate that U. S. registration volume for this month will be about 24 per cent below January, according to R. L. Polk & Co.

Pros and Cons of State Licensing Of Car Dealers Aired in Chicago

Bill in Illinois Legislature Is Discussed At Meeting Sponsored by Trade Association

Some 500 automobile dealers, their salesmen, factory representatives and finance company representatives gathered at a meeting Feb. 23, sponsored by the Chicago Automobile Trade Association, to hear the pros and cons of dealer licensing as may or may not be brought about in the State of Illinois.

The meeting was held principally because of the introduction of a bill in the Illinois Legislature which proposes licensing of dealers and salesmen as well as "regulation" of the automobile business.

The meeting turned out to be one of the liveliest sessions held by the trade association for some time. Those in favor of the bill, if passed, said it would help end abuses in the business.

But just as positive were those against the bill who said it is an attempt to foist a "little NRA" on the automobile business of Illinois.

The first speaker, Harry Meixell, manager of the Legislative Department of the Automobile Manufacturers Association, pointed out that the State licensing acts now in force in Wisconsin, Ohio, Nebraska and Iowa lead to regimentation whereby dealers lose control of many of the phases in their business, making themselves subject to the juggling of politicians. He said that about one-half of the dealers in Illinois probably are opposed to licensing. The pathway is not by regimentation, Mr. Meixell said, but can be worked out with the factories. He went on to say that political bureaus eventually usurp the law-making provisions of the legislatures and rules are put into effect which involve the automobile business into a mess of red tape. Regulatory licensing means that dealers must go to the government annually for renewal purposes. Mr. Meixell stated that dealers will get more improvements in their relations with the factories through conferences than they ever can expect through legislation.

Opposing the manufacturers' side of the picture, Louis Milan, Executive Secretary of the Wisconsin Automotive Trades Association, told of the Wisconsin experiences with dealer licensing. While admitting that some details remain to be ironed out and some corrections were in order by and large, he said the licensing act in Wisconsin has improved the position of its dealers. It was the only way, Mr. Milan said, that the car factories can be "brought to time."

Mr. Milan said that some of the things in favor of licensing included the weeding out of bad business practices as well as unfair cancellations, together with elimination of coercion enforcing dealers to take more cars than needed. In addition, licensing in Wisconsin has made for better business men and resulted in the public knowing what it is getting. The undesirable dealer gradually is eliminated as well as the part-time salesman. Mr. Milan also said that 80 per cent of the Wisconsin dealers are in favor of the licensing law.

Thomas B. Courtney, president of the Illinois Finance Co., delivered a fell blow to the meeting by stating forcefully that dealers had better give considerable thought to the proposed licensing bill and study it from every angle because there is "going to be a law unless the automobile industry cleans its own linen."

The meeting had all of the atmosphere of a typical "town hall" gathering with Samuel B. Shapiro, manager of the C.A.T.A., acting as moderator.

Hopkins Invites

(Continued from page 289)

census of distribution will be considered, are Pyke Johnson, Dawes E. Brisbane, research counsel, National Highway Users Conference, Washington; Henry Lansdale, general manager, National Automotive Parts Association, Detroit.

The new Commerce Secretary dispatched letters to each invitee, expressing the hope that they will "share with us this joint responsibility," and that additional suggestions will be welcome from trade associations and all other interested groups.

40 Years Ago

Preparations for the transformation of *The Horseless Age* into a weekly journal are progressing favorably. Special writers and correspondents are being engaged, and an organization is under way which will enable us, in due course, to produce an up-to-date technical weekly such as the motor vehicle industry demands.

From *The Horseless Age*, March 1899.

DiVco Grants License To the White Motor Co.

The DiVco-Twin Truck Co., Detroit, recently obtained further recognition of its patents in the house-to-house delivery field.

DiVco has granted a license under patents owned by it to The White Motor Co. of Cleveland, Ohio, for the manufacture of White's line of light delivery vehicles known as the "White Horse." At the same time, The White Motor Co. has made settlement with the DiVco-Twin Truck Co. for past infringements of DiVco patents on White models previously built in the stand-drive, or low through-aisle field, and also on the so-called "sit-drive" type of vehicle in which the body of the vehicle extends over the front wheels.

Seventeen other truck manufacturers and body builders have ceased building the stand-drive or low through-aisle vehicle, and have compensated DiVco for past infringement.

Publications

Joseph T. Ryerson & Son, Inc., Chicago, has issued a new bulletin on its Ry **alloy steel.** This steel has been developed to meet a demand for an oil hardening steel which, when heat-treated, would develop high hardness and deep penetration, and have minimum distortion and freedom from cracking.*

American **broaches and various broaching machine tool setups** are illustrated in a 32-page catalog brought out by the American Broach & Machine Co., division of the Sundstrand Machine Tool Co., Ann Arbor, Mich.*

A new 72-page catalog issued by the Johnson Bronze Co., New Castle, Pa., contains much valuable information for bearing users. In addition to complete data on the types and sizes of **bearings** in the Johnson line, the catalog contains an attractive decimal equivalent chart and explains the Johnson consulting service.*

The Landis Machine Co., Waynesboro, Pa., has prepared the first issue of a new bi-monthly direct mail bulletin called **"Thread Tips."***

A circular describing its 12-in. model C **lathe** has been published by Pratt & Whitney division of Niles-Bement-Pond Co., Hartford, Conn.*

"Lest We Regret" is the title of a booklet on **highway safety** published by the Travelers Insurance Co., Hartford, Conn.*

The International Nickel Co., New York, has published an index to the numerous bulletins it has issued on the use of **"nickel in the brass foundry."***

Various tests and manufacturing processes utilized in the production of "Caterpillar" Diesel engines, track-type tractors and road machinery are illustrated and explained in a booklet prepared by the **Caterpillar Tractor Co.**, Peoria, Ill.*

*Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

Canadian Production Declined in January

January production of automobiles in Canada recorded a decline, the output of the factories totaling 14,794 units, compared with 18,670 the month before and 17,624 in January a year ago.

Total for the current month included 11,404 passenger cars and 3390 trucks, of which 7243 passenger cars and 1421 trucks were produced for sale in Canada, the balance being intended for export.

New motor vehicles financed in Canada during January this year num-

bered 1683 compared with 2850 in the previous month and 2265 a year ago. Used vehicles totaled 4680 units compared with 6060 in December and 4461 in 1938.

Walsh-Healey

(Continued from page 293)

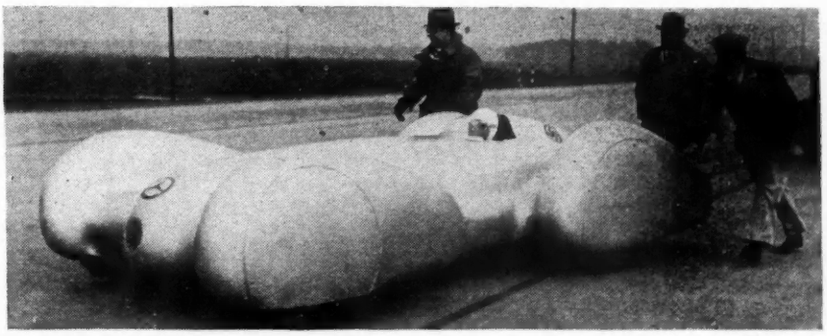
age and maintenance of gages, dies, jigs, tools, fixtures, and other special aids and appliances but adds—and this is the insertion which would exempt companies receiving educational orders from the standards of the Public Contracts Act—that "for the purposes of this act educational orders shall not be considered as contracts for public work or works or for the manufacture or furnishing of materials, supplies, articles, and equipment."

The $34,500,000 would be authorized to be appropriated for use during the fiscal years 1930, 1940, and 1941. During the last session of Congress an educational order program calling for expenditures of $10,000,000 to be spent at the rate of $2,000,000 a year over a five-year period was put on the statute books but there was no proviso which acted to exempt firms from the Walsh-Healey law.

The national defense move presumably is the only barrier standing in the way of the bills introduced by Senator Walsh and Representative Healey, both Democrats, of Massachusetts, which embodies the changes in the law as requested by the Labor Department. Except for the opposition prompted by armament program, the measures are generally conceded to stand a good chance of passage.

Correction

The Elcar Coach Co., Elkhart, Ind., has informed us that it has *not* purchased the building and assets of Lee Trailer Co. and machinery and equipment of the Harris Caravan Coach Co., reported in the Feb. 4 issue of AUTOMOTIVE INDUSTRIES.



European

Mercedes-Benz Record Car

Mercedes-Benz record car with European champion Rudolf Caracciola at the wheel shown as it was being pushed to the starting line for the record trials begun Feb. 8 on the Dessau section of the Reichsautobahn, Germany, Caracciola drove for the Daimler-Benz company.

Prominent European Engineers To Address SAE World Congress

Program Lists Speakers from England, Germany, The Netherlands, Italy, Czechoslovakia, Sweden

Twenty-one of nearly 60 authors of papers to be presented at the 1939 World Automotive Engineering Congress of the Society of Automotive Engineers, May 22 to June 8, will be European automotive engineers and authorities. The overseas speakers who have accepted invitations to write papers are from England, Germany, The Netherlands, Italy, Czechoslovakia, and Sweden. The largest single delegation to book reservations to date is one from France.

The tentative program shows that the Congress will open in New York on May 22 for a five-day session. The gathering will adjourn to Indianapolis where it will spend May 29 and 30, taking in the 500-Mile International Automobile Sweepstakes, and will proceed to Detroit for a three-day series of automobile factory, laboratory, and proving ground inspections, May 31 to June 2. The Congress will spend June 3 in Chicago, where the entire "Super Chief" Diesel streamlined train has been reserved for the trip to San Francisco, via Los Angeles. The Congress will close with a three-day session in San Francisco.

Two outstanding Italian authorities, Dr.-Ing. W. P. Ricart and Dr.-Ing. Sandro Sirtori, of the Alfa Romeo plant, will discuss high-output engines. Propeller and engine vibration problems; bearings for the bigger engines already developed and those under development; the composite type of aircraft; helicopters; trans-Atlantic aircraft design; flight testing of large aircraft; light alloys used in European airplanes; lubrication problems of aircraft engines; European engines and fuels; aircraft Diesel engines, and papers on the huge airliner ships will give the Congress an exhaustive and searching program in the aircraft field.

The Congress has been planned by the Meetings Committee of the Society, headed by Mr. Teetor, vice-president in charge of engineering, Perfect Circle Co., Hagerstown, Ind., and the committee consisting of Dr. George W. Lewis, National Advisory Committee for Aeronautics; Paul G. Hoffman, president, Studebaker Corp.; O. E. Hunt, vice-president in charge of engineering, General Motors Corp., and Mr. Zeder. Ten vice-presidents, each in charge of one of the professional activities of the Society and their respective committees have cooperated in developing the program.

Henry Ford, one of the founders of the Society, heads a list of scores of the leading executives in the industry as chairman of the honorary advisory committee.

Goodyear to Spend $3,000,000 On Akron Expansion Program

Plan Calls for Modernization of Three Plants, Spiking Rumors of Further Decentralization

Announcement of a $3,000,000 Akron expansion program, which definitely spiked rumors that it planned further decentralization of its Akron operations, climaxed the Goodyear Tire & Rubber Co.'s 4-day fortieth anniversary homecoming celebration last week.

The expansion program will include modernization of Goodyear's three Akron plants, to cost $1,800,000. This program will include building modernization, installation of new equipment, and additions to take care of rapidly growing mechanical goods departments. According to President P. W. Litchfield, the program is designed to lower operating costs and make the Akron plants competitive with Goodyear's plants in other states. Two years ago as the result of labor trouble, Goodyear launched an intensive decentralization program, expanding its California, Alabama and Maryland factories, moving its rubber footwear business from Akron to New England, and building a large new tire plant at Jackson, Mich.

Men

Frank M. Smith, vice-president and general manager, Stout Engineering Laboratories, Inc., Dearborn, Mich., has been elected to the board of directors of the Hupp Motor Car Corp.

Forest H. Akers, vice-president and director of sales of the Dodge division of Chrysler Corp., was nominated as a candidate for the state board of agriculture by the Republican party in Michigan at its state convention in Flint on Feb. 23.

Lewis H. Thomas has been named sales manager of the Tank Division of the Fruehauf Trailer Co. Mr. Thomas has been manager of the Denver branch of the Fruehauf company for the past year. Other recent Freuhauf personnel changes are: **D. E. Cowdery**, manager of the Grand Rapids branch; **Earl Wright**, branch manager for Denver; and **F. E. Boylan**, regional manager in charge of Saulte Ste Marie, Saginaw, Grand Rapids and Jackson, Michigan territories.

Frank Oberle, formerly a member of the diesel sales division of Hercules Motor Corp., Canton, Ohio, has joined the sales division of the American Bosch Corp., Springfield, Mass. Mr. Oberle has been previously connected with the American Bosch organization for many years as a fuel injection equipment sales engineer.

The following appointments have been announced by the Alemite division of the Stewart-Warner Corp., Chicago. **J. C. Harger**, former southwest district sales manager, has been transferred to take charge of the southeast sales territory. **A. F. Haberl** is now district sales manager in the east-central territory. He was formerly manager of the southeast sales district, now occupied by Mr. Harger. **Roy A. Sands** has been appointed district sales manager of the southwest.

Maas & Waldstein Co., Newark, N. J., has named **Harlan M. Gale** as a sales representative for the New England territory.

HARVEY J. NESTLE

. . . who has been appointed general service manager of the Chrysler Corp. Central Service Division to succeed T. W. Moss who has been made Director of Truck Sales for the Dodge Division. Mr. Nestle has been assistant manager of Central Service since this unit was first established in November, 1935.

AFL-CIO

(*Continued from page* 294)

specifically provide that the Labor Board could not invalidate union contracts. The chief tactics of the AFL now are to attack the administration of the act rather than the act itself. This is seen as a mollifying influence toward labor unity, even though the AFL's principal attack against the Labor Board is based on the charge that the board is biased in favor of the CIO.

Regarding the difference between the craft and industrial unionism, contention is being made by members of both the AFL and the CIO that the schism is not so basic as has been commonly represented. It has been pointed out that progressively AFL units are built upon the principle of industrial unionism and that quite conceivably with some modification the two bases of labor organizations could be welded together with craft unions prevailing exclusively in only the more highly skilled trades. In this connection it was explained that the AFL had established industrial unionism in the automobile industry long before the CIO took the reins and organized the UAW which now is split wide open into two bitter factions. Predictions are made that, should the AFL and CIO finally unite, the differences between the two opposing UAW forces would be ironed out and that after the ousting of radicals it would be reestablished along the lines of industrial unionism.

U. S. Aeronautic Exports Advanced 53% in January

Statistics compiled by the Department of Commerce show that aeronautic exports from the United States in January were valued at $4,892,218, an increase of 53 per cent over January, 1938, when the value of the trade was recorded at $3,190,281. Irving H. Taylor, chief of the Automotive-Aeronautics Trade Division, of the Department of Commerce, reported early this week that ensuing months of 1939 are expected to register rapid advances over all previous exports of aeronautic equipment.

Aircraft exports during January totaled 72 units, valued at $2,545,922, an increase of 140 per cent in number, and 243 per cent in value, compared with January, 1938. There were 94 aircraft engines shipped abroad during January of this year, valued at $587,946, a decrease of 4 per cent in number and 1 per cent in value compared with January, 1938. Parts and accessories were valued at $1,639,119, a decrease of 11 per cent, while exports of parachutes and parts were valued at $119,231, an increase of 890 per cent. Exports of engine parts, accessories, instruments and parts, included with parts and accessories, were valued at $429,190 and $136,046, respectively.

The United Kingdom, France, and the Netherlands Indies were the principal markets, these three countries accounting for January exports valued at $3,292,300, or 67 per cent of the total trade.

WPA Reports Purchases Of Trucks and Tractors

Figures compiled by the Works Progress Administration covering the three and one-half years ended Dec. 31, 1938, shows that out of $900,000,000 worth of orders placed in private industrial channels as a result of projects undertaken, $5,122,931 was spent for motor trucks and tractors. The WPA claimed that $4,133,949 represents the federal funds expended and $988,982 the sponsors' funds to make up the total.

During the same period, $2,417,884 went for tires and rubber goods, of which $1,581,546 represented federal funds and $836,338 from the funds of sponsors.

Le Tourneau Develops Sugar Cane Harvester

Development of a mechanical sugar cane harvester has been announced by R. G. Le Tourneau, Inc., San Francisco, manufacturers of heavy duty earth moving equipment. An experimental model of the harvester has been consigned to the Hawaiian Sugar Planters' Association.

R. G. Le Tourneau, president of the company, designed the harvester after a trip to the islands last winter, when he surveyed the harvesting problems of sugar planters. The new machine is similar in operation to a grain harvesting combine.

Power for the harvester is supplied by two Caterpillar Diesel engines. One engine of 160-hp. supplies motive power and another of 100-hp. generates elec-

tricity for motors operating a rotary cutter, a blower and conveyer belts.

The complete assembly weighs about 40 tons and measures more than 12 feet high, almost 14 feet wide and more than 40 feet long. The harvester is mounted on two drive wheels which are equipped with 36 by 96 inch pneumatic tires. Only one man is needed to operate the entire outfit.

Business

(*Continued from page* 291)

000, according to *Engineering News-Record*, and represented a gain of 56 per cent over the total for the like week last year.

Lumber production increased less than seasonally in the week ended Feb. 18, and the slight gain in new orders was countered by a similar decline in shipments. For the first seven weeks of this year production was 27 per cent greater than in the like period last year.

A greater than seasonal increase in cotton-mill activity in the week ended Feb. 18 was reflected in the rise of the *New York Times* index to 118.7, as against 117.8 for the preceding week and 88.7 a year ago.

Professor Fisher's index of wholesale prices for the week ended Feb. 25 rose three fractional points to 80, again standing at the 1939 maximum to date recorded in the first week of the year, as compared with a low of 79.5 reached in the week ended Feb. 11.

Reserves of member banks of the Federal Reserve system, interrupting the decline that had persisted for three successive weeks, rose $133,357,000 in the week ended Feb. 21. Estimated excess reserves increased $130,000,000 to a total of $3,300,000,000.

GM-Cornell Index Remains at 60.7

The General Motors-Cornell World Price Index of 40 basic commodities for the week ended Feb. 18 was 60.7, the same figure registered for the previous week. The United States index in gold also remained the same, 62.9.

Mack Trucks Lost $929,171 in 1938

The annual report of Mack Trucks, Inc., for 1938 shows net sales totaling $25,595,925 as compared with $34,212,794 for 1937. Net operating profit amounted to $332,561 before deductions for depreciation, maintenance, etc., totaling $2,121,323. Other net income for the year aggregated $869,589, leaving a final net loss for the year of $929,171. The company's operations in 1937 produced a net profit of $1,284,691.

District Court Temporarily Bans Minimum Wage Rate in 3 Plants

Ourselves and Government—A Check List Of Federal Action Corrected to March 2

TEMPORARY NATIONAL ECONOMIC COMMITTEE

FTC opened its part of the anti-monopoly inquiry on Tuesday when Commission spokesmen presented background information covering the FTC's program under the investigation. The iron and steel and the farm machinery industries were scheduled to come up for consideration later in the week. The FTC case presentation was divided into three parts: (1) a prologue; (2) a general summary of FTC experience during the past seven years; and (3) an account of what the Commission termed "monopolistic conditions existing in 13 industries at the present time." Industries mentioned include "motor vehicles," but there were no indications that the FTC's experience in any motor vehicle inquiry would be discussed at the current sessions, which are expected to continue for about two weeks.

FEDERAL TRADE COMMISSION

VS. GENERAL MOTORS. (No change.) The case, identified as the exclusive dealing case, involves the complaint that GM dealers allegedly are required to handle GM parts exclusively.

FOB PRICE CASE. Date for GM hearings in Detroit has been postponed from Feb. 21 to March 7. Hearings also due in the Ford case but date has not been set. It had previously been scheduled for Jan. 25 but cancelled. The FTC is expected to close the Ford case immediately after the hearings. Both Ford and GM cases involve the FTC allegation that price advertising was misleading.

VS. UNITED STATES RUBBER CO. Respondents have asked for additional time to reply to the complaint and the FTC further extended the time for filing from March 1 to March 4. The FTC alleged unlawful price discrimination in the sale of tires in violation of the Robinson-Patman Act. Also involved is the United States Tire Dealers Corp. of New York, a subsidiary.

DEPARTMENT OF LABOR

STEEL WAGE ORDER. The United States District Court for the District of Columbia issued an order on Monday temporarily restraining the Secretaries of Labor and Navy from putting into effect the 62½ cents minimum steel wage rate in the East under the Walsh-Healey Act with respect to three steel plants—the Lukens Steel Co., of Coatesville, the Alan Wood Steel Co., of Conshohocken, and the Central Iron & Steel Co., of Harrisburg, Pa. Four other independent steel producers in the East had sought an injunction but the court singled out these three as the only ones of the seven submitting bids to be opened on March 2 and March 9 by the Navy Department. Justice Jennings Bailey fixed March 6 for a further hearing, at which time the temporary order will be either terminated or continued.

On Tuesday, Assistant Secretary of Labor Charles V. McLaughlin advised Roberts B. Thomas, counsel for a committee representing 29 small Eastern iron and steel producers, that the Department could not postpone the effective date of the order beyond March 1 to April 3, as had been requested by the group.

NATIONAL LABOR RELATIONS BOARD

NLRB has announced certification of the AFL union as collective bargaining units at the American Enameled Magnet Wire Division, Electric Auto-Lite Co., of Port Huron, Mich., as a result of a secret ballot election in February in which the AFL union polled 296 votes as against 210 for the CIO's United Automobile Workers Union.

Calendar

Conventions and Meetings

SAE National Aeronautic Meeting, Washington .....March 16-17
American Foundrymen's Association, Forty-third Annual Convention, Cincinnati .....May 15-18
SAE World Automotive Engineering Congress .....May 22-June 8
Automotive Engine Rebuilders Association, Seventeenth Annual Convention, Baltimore, Md. .....July 5-7

Shows at Home and Abroad

Sixteenth International Automobile Exhibition, Geneva, Switzerland, March 3-12
A.S.T.E. Machine and Tool Progress Exhibition, Convention Hall, Detroit .....March 14-18
Yugoslavia, Belgrade, Automobile Salon .....April 1-8
Great Britain, London, Automobile Show .....Oct. 12-21
Italy, Milan, Automobile Salon, Oct. 25 to Nov. 11
International Automobile, Motorcycle and Motor Boat Show, Budapest, Oct. 27 to Nov. 6
Great Britain, London, Commercial Automobile Transportation Show, Nov. 2-11
Great Britain, Glasgow, Scotch Automobile Show .....Nov. 10-18

Advertising

A car will be given away weekly during March to motorists who write the most interesting impressions of their ride in a new Oldsmobile "60." Dealers supply entry blanks. D. P. Brother & Co. is the agency.

Greyhound Management Co., Cleveland, announced an additional expenditure of $300,000 to be spent immediately to promote travel by bus to the New York and San Francisco fairs. The year's advertising outlay will be well over $1,000,000. Beaumont & Hohman is the agency.

A. F. Bement and R. C. Sackett, veteran automotive advertising men, Detroit, were mentioned among the good roads pioneers of the country by Lawton Wright in his recent article in the *Saturday Evening Post*.

Gar Wood Industries, Inc., has named Creative Agency Associates, Detroit, to handle its advertising work. Gilbert U. Radoye is head of the agency.

GM Canadian Facilities Offered to War Office

In the event of a national emergency, all plants and facilities of General Motors of Canada, Ltd., in Canada and other parts of the Empire would be placed at the disposal of the British War Office and the Department of National Defense, Ottawa, Ont., H. J. Carmichael, vice-president and general manager of General Motors of Canada, Ltd., Oshawa, Ont., has announced.

Mr. Carmichael, who arrived in Regina, Sask., from Oshawa in the course of a Dominion of Canada tour, said use of all General Motors facilities in Canada had already been offered to the British War Office and the National Defense Department and in case of emergency those bodies would be allowed to use the facilities in any way they saw fit.

Pierce-Arrow Trustee Is Granted Discharge

The application of A. Howard Aaron to be discharged as trustee for the defunct Pierce-Arrow Motor Corp. has been granted in Federal Court by Federal Judge John Knight.

Attorney William I. Morey, representing the trustee, told the court there was no money available to pay any part of the approximately $2,000,000 in claims filed by the general creditors when the motor corporation filed a petition for reorganization in December of 1937.

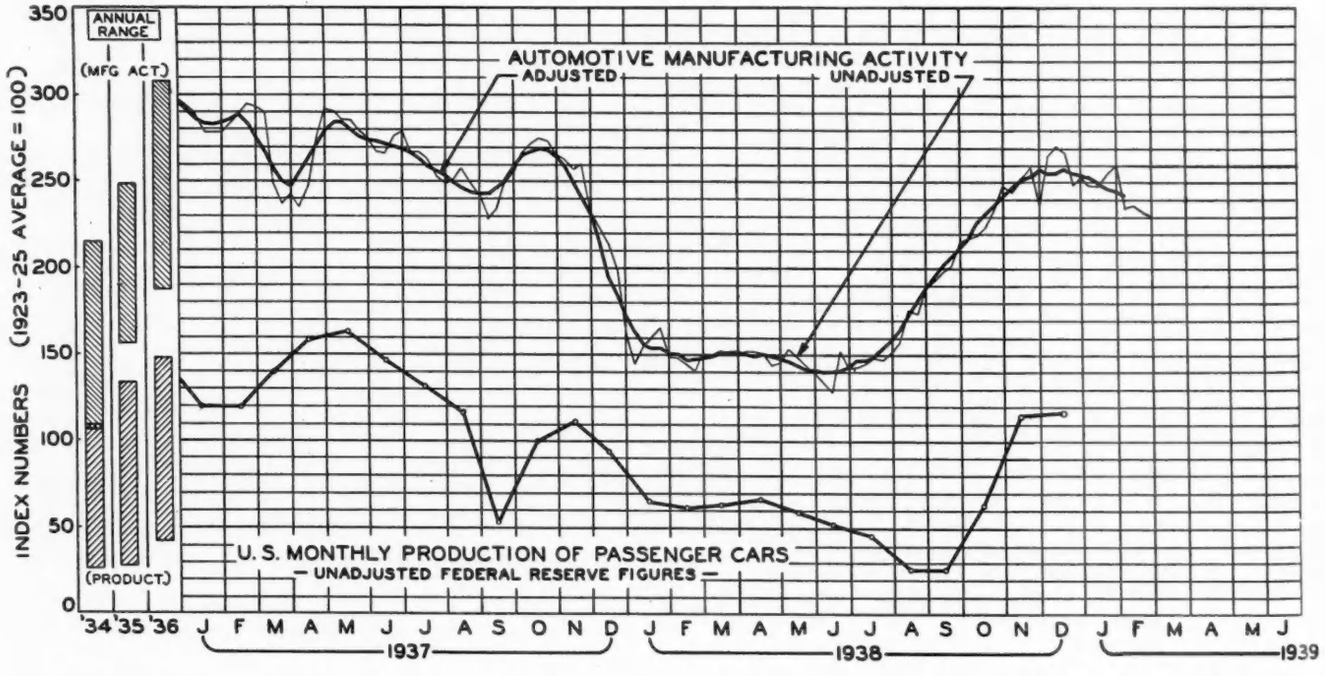
Out of $9,331 on hand, Mr. Morey said, approximately $3,000 will be required to pay administration expenses and the balance will be applied on the retirement of $20,000 worth of reorganization notes held by 1695 Elmwood Ave. Corp. The notes were issued to provide funds to maintain the property during the time of the reorganization.

Books

DEUTSCHE KRAFTFAHRTFORSCHUNG HEFT 15: WELLENFORMIGE REIFENABNUTZUNG *(Waveform Wear of Tire Treads), by Dr-Ing. Hanns Peter Zoeppritz and Dipl-Ing. Ludwig Huber. Published by VDI-Verlag GmbH, Berlin NW7.*

The causes of this wave-form wear, which, according to the author, has been observed particularly on the Autobahnen, were arrived at by a method of elimination. This form of wear occurs almost exclusively on the non-driving wheels. The effect, moreover, is the more pronounced the larger the non-skid formations on the tread. It is stated that the anti-skid knobs at first wear most on their rear side, which results in a sort of saw tooth-shaped profile. The irregularity of the contact surface thus produced results in greater scuffing action between tread and pavement. In this way areas of abnormal wear are further increased, with the result that eventually flat spots appear over the entire circumference of the tire, and the effect, is the more pronounced the smoother and more uniform the pavement.

Manufacturing Activity Index Eases Off Further to 230



Downhill movement of the unadjusted index of manufacturing activity continues as the light line curve dips to 230 for the week ended Feb. 25. The three-point drop from the previous recording naturally further lowers the adjusted index to bring the heavy black curve down to 242. Production edged up slightly for the week ending March 4 and consensus of opinion throughout the industry is that succeeding weeks will show evidences of heavier schedules following in the wake of normal seasonal pickup in sales.

Just Among Ourselves

An Innovation We Hope You Like

ATTENTION of all design and production engineers is directed to the article on "How Connecting Rods are Made," which begins on the overleaf of this issue. In our view the article is noteworthy for at least two reasons. It represents a change of pace in the first-of-the-month manufacturing articles which have been appearing in AUTOMOTIVE INDUSTRIES for more than two years, by introducing a survey of practice on a single component in many plants, instead of a single-plant description. By introducing sectional drawings of the parts under discussion into production routing tables, it coordinates design and manufacturing information more closely than has been attempted before. We have a feeling of satisfaction at having achieved an example of a form of editorial coordination which has been in the back of our heads for some time. We hope you share the feeling. If you do, other articles using similar techniques and reviewing current production methods on other engine components will appear during the remainder of this year.

New Austin A Bigger Car

THE new Austin "Eight" introduced in England is much closer to the American idea of a light car than have been the British baby designs. Back of that fact is, of course, the reduction in British horsepower tax put into effect more than a year ago. The high cost of taxes on a car powered by an engine of large bore required a large sector of the British public to be content for many years with what most Americans would have called a "puddle jumper" of an automobile. With the tax reduced, there seems to be a tendency among British manufacturers to build up to the market.

Smaller Cars For The American Market

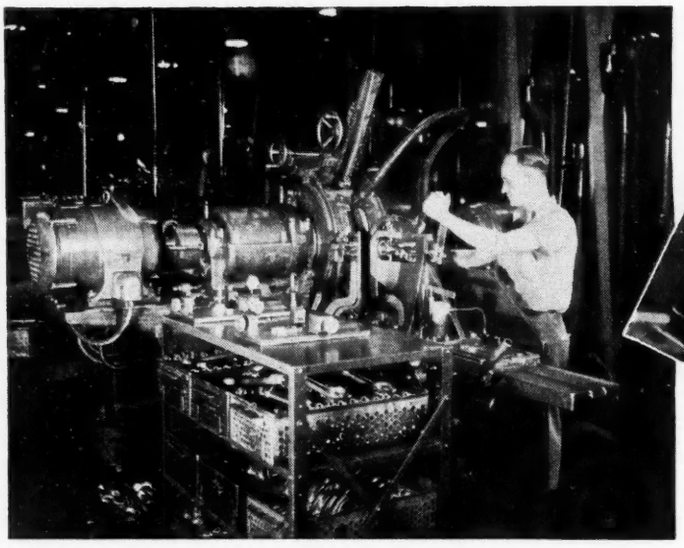
IT has been demonstrated many times in our own market that size and appearance of automobiles talk louder than operating economy—when the national income is at a good level. Attempts to introduce small, light passenger cars have been rather unsuccessful unless they were pretty close to the common denominator of passenger car transportation.

But a protracted diminution in the national income would undoubtedly bring some changes. It is significant that most of the design-thinking which is being done about rear-engined automobiles is concerned with cars smaller than most of those on the road at the present time. One sound reason for this is that concentrating a lot of engine weight in the rear of a vehicle would tend to convert the car into a destructive pendulum during a head on collision. Another sound reason is that if rear-engined cars come into the American market, they will reverse the axiom that it is easier to try out new developments on larger and more expensive cars, selling in smaller numbers. The axiom holds true when a single gadge can be installed within the framework of the design. But when a whole new layout is in view, it would be pretty expensive to run the risk of having the whole business unacceptable.

It is now pretty well known that every American factory with the necessary working capital is playing around with rear engine jobs. One of the most interesting to come to light will be described in some detail within the next few weeks.

GOODRICH and Ford have both published interesting almanacs for the 1939 farm market. There is a perennial fascination about such repositories of miscellaneous information which probably makes them good institutional advertising media. They build a homely flavor around a company's activities that is difficult to approach from any other direction. If you have a public-relations program (and you should have in one way or another) don't neglect the humble almanac as one of its printed products.—HERBERT HOSKING.

THIS IS THE THIRTY-FIFTH IN THE SERIES OF MONTHLY PRODUCTION FEATURES



At the right is shown the finish boring of big end bores at the Hercules plant on a four-spindle Baker drill press set-up while in the left hand view both sides of the Hercules connecting rod bore faces are being finish-ground on a No. 84 Gardner disc grinder

How Connecting Rods

By JOSEPH GESCHELIN

LOOKING back over the stimulating background of 34 monthly studies of the great manufacturing plants of the industry which have appeared in the first issue of each month in AUTOMOTIVE INDUSTRIES, we have been impressed with the interest and cooperative spirit of production executives, impressed with the desirability for special studies of manufacturing procedures. With this in mind, for the year now unfolding, we have designed a group of survey articles each one dealing with the production of a single major part.

The present article, the first of the group, deals with the production of connecting rods, drawing upon the practice of selected organizations representing passenger cars, heavy-duty engines, and tractor engines. The connecting rod is an unusually good example of current practice since it utilizes a fairly large variety of techniques and equipment and provides a valuable album of operation sequences.

It should be emphasized at the outset that no attempt is made, and in fact no attempt could be made, at comparison of procedures, nor is there any effort at pointing to standardization or unanimity of practice. Nonetheless, the very variables that preclude standardization cast an illuminating spotlight on the manner in which each of the producers has found it possible to solve his own specific problem with the aid of modern production tools, tempered by the dictates of seasoned engineering practice.

In considering any survey of practice it is important to recognize at least the major influences that circumscribe the production set-up. Among such variables, applied specifically to connecting rods, are the following:

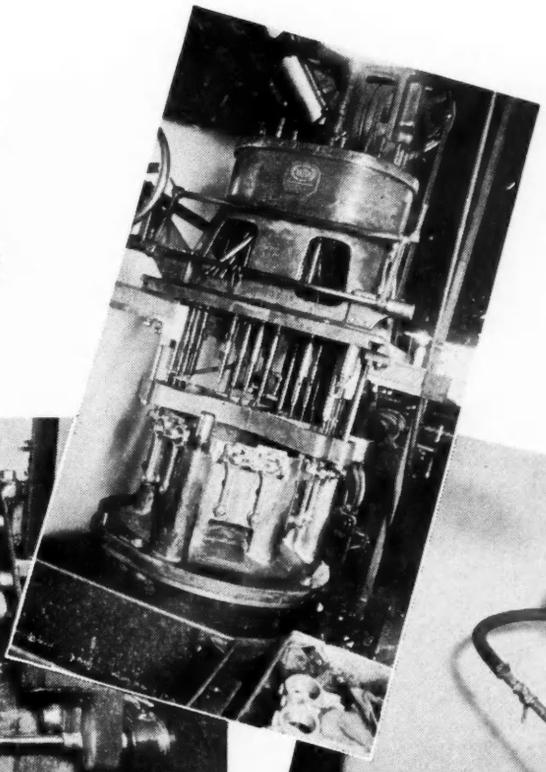
1. Volume of production
2. Engine design and service requirements of the product
3. Part design due to the influence of (2)
4. Bearing—type and design

In appraising this outline, we are inclined to place the burden of any machine shop program on item 1—volume of production—since that determines largely the sequence of operations, type of equipment, fixture design, etc. The other variables provide the differences inherent in product of different makes but not so basically as does productivity.

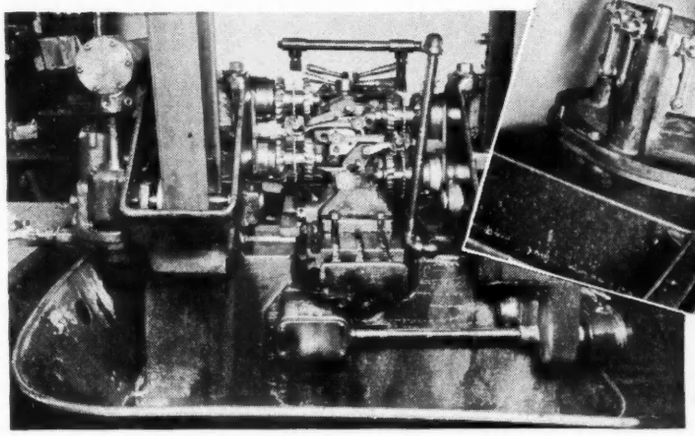
Examples for the present survey have been chosen purposely to illus-

The upper illustration shows a Natco multiple drilling machine set-up at the Continental plant, drilling bolt holes, four at a time

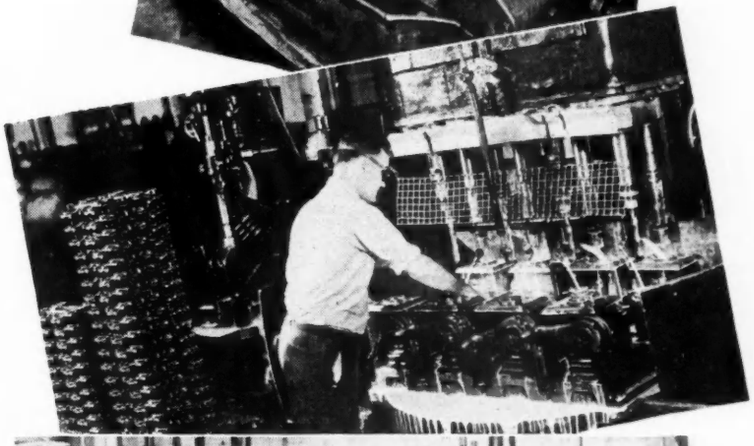
Directly below is the business end of a 24-in. Cincinnati duplex mill, at Continental, milling nut seats and sawing off the cap. The fixture holds four rods at a time.

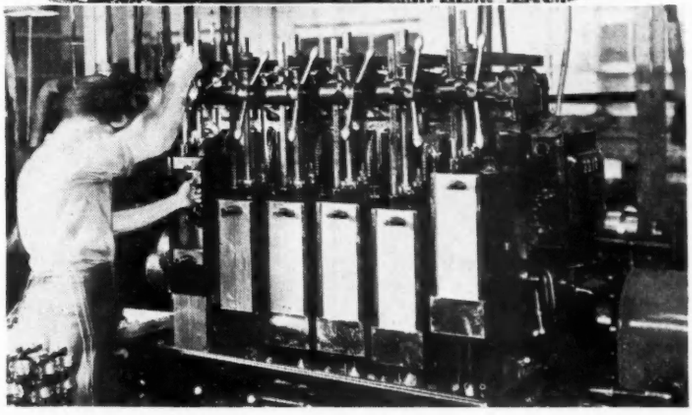


Directly below is seen a Blanchard grinder at Continental surface grinding the face of the big end, one side at a time.



Are Made





trate set-ups for different rates of productivity—from high production procedure to the multiple-lot production exemplified by heavy-duty engine builders who find it essential to schedule a large variety of rods over the same machine line. Both extremes provide invaluable experience. In the first instance we find the highest degree of sub-division of operations, utilizing practically single-purpose equipment; in the case

The two lower views at the right were taken at the Waukesha plant, the upper one showing a flexible tool set-up on a Rockford 8-spindle drilling machine for drilling the wrist pin hole and the big end. The lower view is of a six-spindle Pratt & Whitney deep hole drilling machine for rifle drilling the connecting rods

of multiple-lot manufacturing there is illustrated the consummate skill in the tooling of universal types of equipment so as to achieve favorable cost economy combined with the maximum of flexibility.

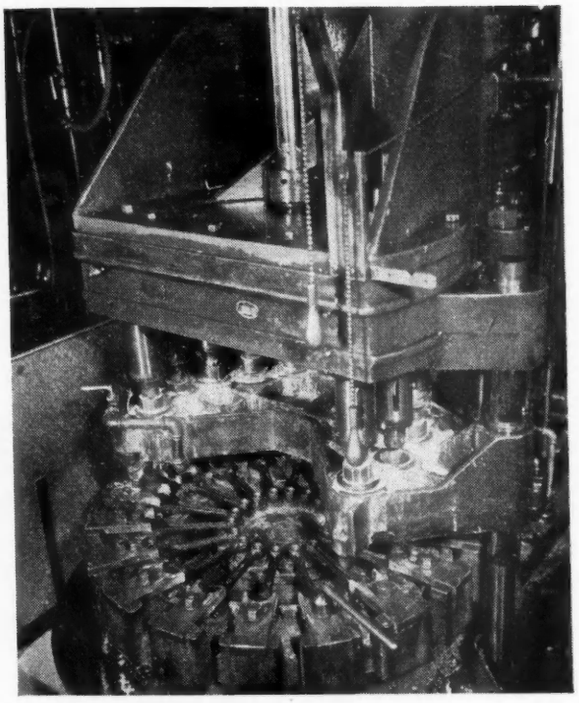
The burden of this presentation will rest upon factory routings reproduced through the courtesy of the manufacturers cooperating in this project. These operating sequences are supplemented by drawings of the con rod assemblies and by a comprehensive pictorial section in which we present an unusual cross-section of manufacturing procedures in many outstanding plants. In a study of the factory routings we direct your attention to the basic, though not at all novel observation, that in general, the mass production set-up features a larger variety of operations due to a finer sub-division of functions; while, by the same token, the multiple-lot set-up has relatively fewer operations due to a shorter line-up of more flexible equipment where greater reliance is placed upon fixtures and tool setting and skill of the operators.

The following manufacturers are represented in this survey:

Allis-Chalmers
Buda
Buick
Caterpillar
Chrysler
Continental
Hercules
Minneapolis-Moline
Nash
Packard
Plymouth
Waukesha

Having before us the open record of manufacturing procedures as developed out of a rich experience by each of these manufacturers, it is not difficult to emphasize some high-spots that characterize connecting rod manufacture in the present stage of development. These may be best illustrated by the following outline:

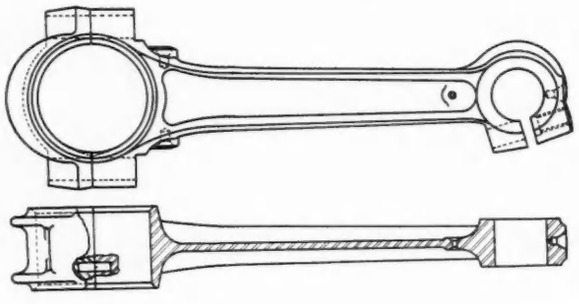
1. Foremost characteristic of



Hydraulic drilling and reaming machine, core drilling and reaming crank bore diameter on Plymouth connecting rod. Three-station indexing fixture enables operator to load six parts while core drilling six and reaming six

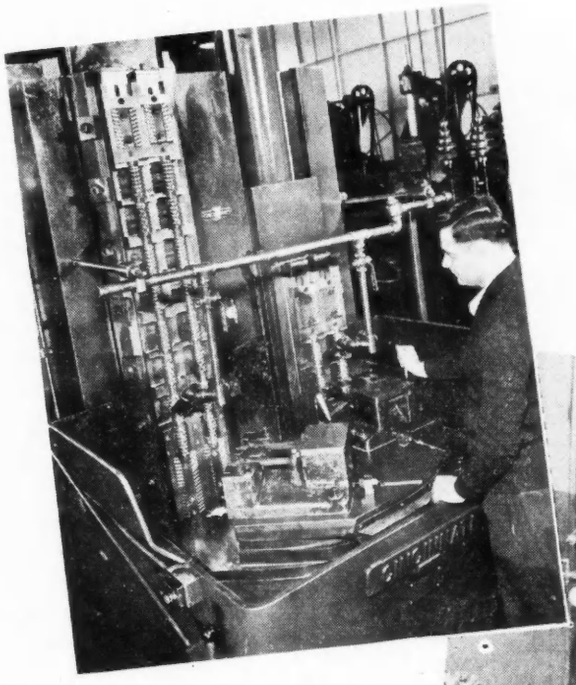
Hercules Factory Routing (Canton)

High Lead Rod & Cap (Combined Sequence) JX & QX



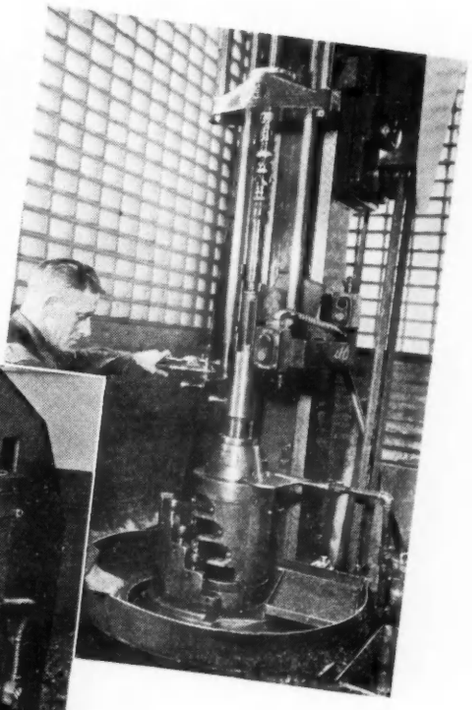
OPERATION	EQUIPMENT
Straighten rod	Bench
Center rod	Pratt & Whitney 3-way machine
Mill contact face	Ohio rotary mill
Rough surface grind contact face of cap	No. 4 Gardner disc grinder
Drill 2 bolt holes in rod and cap	Fox multiple drill
Drill large clamp screw hole in rod	Cincinnati single spindle 20 in. drill press
Spotface clamp screw hole in rod	Cincinnati single spindle 20 in. drill press
Spotface bolt hole on cap	Superior single spindle 20 in. drill press
Drill small clamp screw hole in rod	Aurora single spindle 20 in. drill press

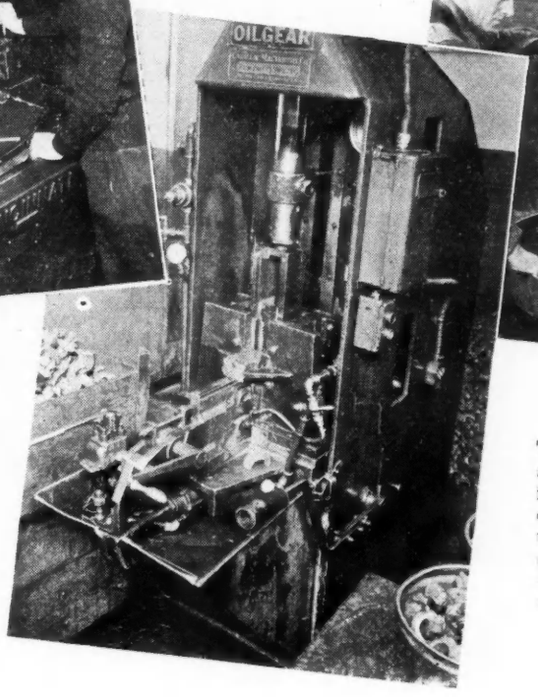
OPERATION	EQUIPMENT
Tap clamp screw hole in rod	Garvin tapper
Mill bolt relief on rod	Cincinnati 24 in. duplex mill
Parkerize rod and cap	
Straddle mill crank end of rod and cap	Ohio rotary mill
Finish disc grind contact face on cap	No. 4 Gardner disc grinder
Finish disc grind crank contact face of rod	No. 4 Gardner disc grinder
Drill and ream wrist pin hole	Natco multiple drill
Grind wrist pin hole	Heald Gagematic grinder
Notch cap	Hand mill—U. S. Machine Tool Co.
Notch rod only	Hand Mill—U. S. Machine Tool Co.
Assembly for rough and finish bore crank end	Bench
Rough bore crank end of rod and cap assembly	4-spindle Baker drill
Finish bore crank end of rod and cap assembly	4-spindle Baker drill
Grind both sides, crank end of rod and cap assembly	No. 84 Gardner disc grinder
Grind inside diameter crank end of rod and cap assembly	Heald Gagematic grinder
Chamfer crankshaft bore in rod and cap assembly	No. 310 Baker single spindle drill
Inspect crank end for size	Bench
Saw wrist pin slot in rod and cap assembly	Cincinnati 18 in. horizontal power feed mill
Snag and burr rod and cap assembly	Bench
Final inspection	Bench



Directly above is a duplex hydraulic broaching machine working on the joint face and crank half-bore in one setting. Plymouth feature is the automatic indexing table permitting the loading of two rods in one fixture while the ram is broaching two in the other fixture

At the right is shown a hydraulic honing machine used at Plymouth for honing the crank bore. The special fixture holds three rods at a time.





The center view shows another hydraulic broaching machine at Plymouth, this a single-ram unit for broaching both sides of the cap. Two caps at a time are handled in an air-operated fixture

Packard Factory Routing

Motor Connecting Rod & Cap

OPERATION	EQUIPMENT
Check for straightness and straighten	
Chamfer one side of piston pin boss	Barnes Drill Co., drill press
Broach both sides of bolt bosses and nut and bolt seats	Duplex Cincinnati vertical hydraulic broach
Saw caps from rods, leave stock on joint face for finish	34-36 Cincinnati hydromatic mill Cincinnati milling machine
Drill and ream bolt holes in rod and caps, drill Nos. 30 and 56 oil holes in rod and countersink 90 deg. to 13/32 in. dia., mill lock grooves in rod and cap	
Countersink bolt holes in rod and cap	U. S. reamer drive (pedestal type)
Drill long oil hole through web	Leland-Gifford 6-spindle drill presses
Select and assemble rod and caps using bolts and nuts	
Grind face of both bosses parallel	No. 16 Blanchard grinder
Drill and ream wrist pin hole	Davis 16-spindle horizontal drill
Boream crank pin hole	No. 1-A 4-spindle Edlund drill press
Chamfer piston pin hole	U. S. reamer drive
Chamfer crank pin hole both sides	Cincinnati drill press
Weigh and hollow mill large end	Garvin horizontal drill
Burr holes in crank and piston pin hole and blow out long hole	
Press in bushing and burnish hole	Fox double ram hydraulic press
Chamfer bushings in piston pin hole	U. S. reamer drive
Weigh and hollow mill small end both sides	Garvin horizontal drill
Grind large hole	Rockford drill Heald Gagematic grinders
Wash and blow out	
Diamond bore piston pin hole	Ex-Cell-O No. 1212 6-spindle diamond boring machine
Remove burrs	U. S. reamer drive
Clean oil hole	
Wash and blow off	
Inspect	Toledo scales

current practice is insistence upon precision methods, modern gaging and inspection devices. In this category will be found equipment such as Johanssen gage blocks, Sheffield gages, Electrolimit gages, etc.

2. Inherent in most high-production set-ups is the utilization of surface broaching running the gamut of well-known equipment such as Cincinnati, American, Colonial, La-Pointe, and the like. While it is more difficult to harness this technique to multiple-lot production, it is not unlikely that future modernization programs will be able to take advantage of the more flexible, universal types of single-ram surface broaching machines, fitted with interchangeable tools and fixtures.

3. High-production set-ups are enabled to utilize to an amazing degree the principle of accurate weighing through the use of modern scales, and to transfer the result to quick-setting fixtures which permit machining to common weight.

4. Among the precision operations demanded with modern interchangeable bearings are the almost universal use of diamond-boring for the small end and precision grinding, sometimes followed by honing, for the big end.

5. Increasing adoption of temperature-controlled, conditioned-air booths or departments for housing the finishing and assembly operations.

With this introduction, we can turn our attention to a brief high-spotting of some of the major features of con rod manufacturing in each establishment mentioned in this survey.

Hercules

The machining of the Hercules connecting rod is a very interesting example of the problem of handling a great variety of engine sizes under one roof. The machine line is developed specifically to facilitate the manufacture of a wide range of product over a single line. This demands great skill on the part of factory executives in the design of interchangeable fixtures and tooling. Too, this type of operation relies to a great extent upon skilled operators capable of accommodating themselves to a change of fixtures and product during the course of the day.

The rod is forged in two parts so that both rod and cap are processed separately but simultaneously so as to produce matched pairs. First operation here is centering of the rod on a special Pratt & Whitney machine. Succeeding operations take place on universal machines indicated on the routing.

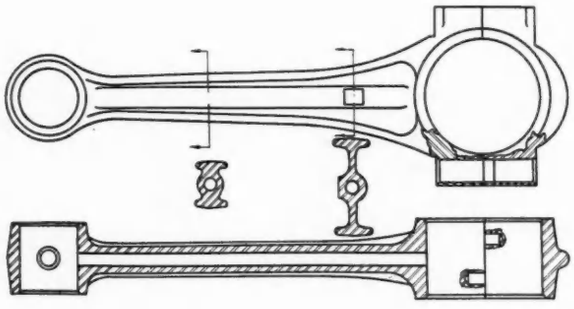
Note that the crank bore is rough-bored, finish-bored, then ground on a Heald Gagematic machine. The wrist pin hole is drilled, reamed, then finish-ground on a Heald Gagematic.

Packard

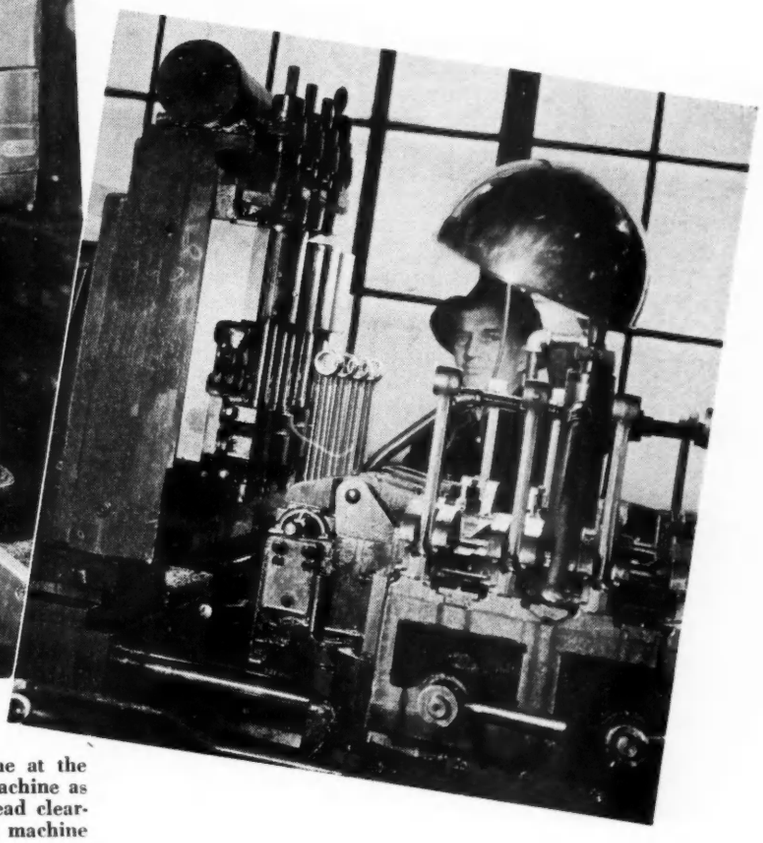
An excellent example of mass production in the passenger car field, the Packard rod is made from a one-piece forging, on a line utilizing more or less unit-type and single-purpose equipment capable of seasonal changeover. As will be noted, the routing indicates the use of surface broaching equipment at least on one operation — finishing bolt boss seats and sides. The machine for this operation is the familiar Cin-

Waukesha Factory Routing

Connecting Rod



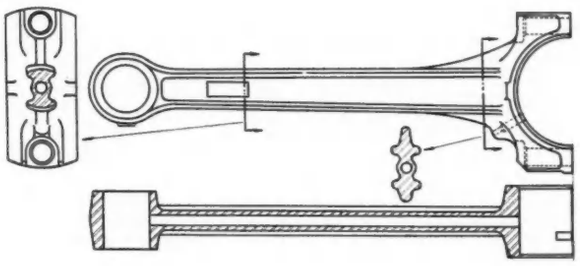
OPERATION	EQUIPMENT
Dip in rust proof solution	Special dipping machine
Grind bolt bosses for drilling boss	Yucan grinding wheel
Drill wrist pin hole and bore bearing end	Rockford 8-spindle driller
Rough and finish wrist pin hole and chamfer wrist pin hole, file burrs bearing face one side and chamfer wrist pin hole both sides	Barnes Drill Co. drill press Canedy - Otto driller
Straddle mill sides full length	Hill & Clark hand miller
Mill locating spot on side wrist pin boss	Henry-Wright 2 - spindle drill press
Drill and ream bolt holes	Natco 8-spindle multiple drill press
Saw off cap and mill bolt seat	Kearney & Trecker 2-spindle miller
Chamfer bolt holes in rod and cap	Special bench reamer
Drill oil hole through rod	Pratt & Whitney 6-spindle deep hole driller
Grind burr on rod and cap	Special bench grinder
Disc grind shim faces of rod and cap and wash	18 in. 2-wheel disc grinder
Assemble rod, cap and shims with work bolts and nuts	Bench for assembly
Grind both sides of bearing end	Blanchard surface grinder
Semi-finish bore crank pin hole plus	4-spindle Rockford horizontal bore
Grind crank pin hole to size and chamfer both sides	Heald Red Head internal grinder Freeport single spindle drill press tanks
Wash emery dust from oil hole	Atlas arbor press
Press in bushing and burnish	Tanks
Chamfer wrist pin bushing both sides	Special 3-spindle bench reamer
Diamond bore wrist pin hole	Waukesha Motor Co. diamond bore
Disassemble cap from rod	Bench
Mill bearing shell lock slots in rod and cap	Fox hand miller
File burrs off shim faces, rod and cap, scrape grooves, burr and chamfer oil line, wire brush scrape and blow out oil hole, assemble with shims, caps and nuts and stamp cap	Bench—final assembly Hill-Clarke Mach. Co.
Tighten cap to rod with air wrench	Bench
Clean rod with gas and blow off	Bench
Weigh and mark	Toledo scale
Inspect	
Dip in rust proof solution and truck	Bench



Drilling oil holes in the connecting rod end is done at the Nash plant on the Kingsbury three-spindle drilling machine as shown above. At the right is shown how the bolt head clearance is milled on this special Productomatic milling machine

Nash Factory Routing

Connecting Rod



OPERATION	EQUIPMENT
Cut steel and truck to hammers	Pels shear
Forge	2000 lb. Erie hammer
Cold trim	No. 57 Toledo press
Restrike	
Harden	Hevi duty furnace
Draw	No. 3 Lindberg furnace
Tumblast	American tumblast
Coin	Toledo press
Drill small end and semi-finish ream	Fox hydraulic drill
Chamfer both sides of small end	Leland-Gifford drill press
Blow chips from pin hole	Air hose
Broach radius and joint face	Foote-Burt broach
Drill bolt holes	Davis & Thompson drill
Blow off rods	Air hose
Ream bolt holes	Davis & Thompson roto-matic
Mill bolt head clearance	Productomatic mill
Chamfer both holes	Leland-Gifford drill press
Broach locating spot on each end, also cam clearance	Foote-Burt broach
Drill ⅛ in. and No. 54 holes	Kingsbury 3-spindle drill
Mill bearing lock	Wisconsin hand mill
Press in bushing, chamfer and burnish	Toledo press
Gun drill rod	Leland-Gifford 3-spindle drill
Chamfer oil hole in bushing	Burring machine
Surface grind joint face	Nash built grinder
File burrs and lay in pan	
Run pan through washer and remove from pan	Crescent washer
Pour oil over bolts, dip rods in oil and press in bolts	Flexible press
Assemble cap, start nuts and tighten	
Straighten	Bench
Grind both sides of large end, check for width and hang on Degreaser chain	Hanchet surface grinder Detroit degreaser
Rough and finish ream, chamfer both sides of large end. Hang on Degreaser chain	Davis & Thompson Roto-matic
Degreaser chain	Detroit degreaser
Pick and blow out chips	Air hose
Diamond bore pin hole and place in rack	Heald Bore-matic

cinnati Duplex vertical hydraulic broach.

Unique with Packard is the use of the Packard (patented) "Boreamer" for reaming the crank bore. This interesting tool, designed to produce straight accurate holes was described in AUTOMOTIVE INDUSTRIES some time ago. The bore is finished, after reaming, by grinding on a Heald Gagematic.

Wrist pin holes are diamond-bored on a special 6-spindle Ex-Cell-O precision boring machine.

Motor connecting rod assemblies are hollow milled for weight at both crank pin and wrist pin ends. Rods are then selected in motor sets to within $\frac{1}{8}$ ounce variations.

Waukesha

This is a one-piece forged rod, produced on a new machine line which was designed specifically for multiple-lot production in keeping with the great variety of engines produced by this company. Typical of tooling on this line is equipment designed to handle seven rods of different lengths. Such machines are fitted with a special Waukesha-designed head, changed over merely by interchanging the bottom plate and using the same spindles. In general, the line is equipped with flexible unit-type and universal-type machinery capable of quick change-over.

Among the multiple-spindle set-ups found on this line are the following: Rockford 8-spindle driller for drilling the wrist pin hole and boring the big end; the Natco 8-spindle drilling machine for drilling and reaming the bolt holes. The latter is one of the machines fitted with the special Waukesha-designed head mentioned above.

The rods are not machined to common weight but at assembly they are weighed in sets to $\frac{1}{4}$ ounce per set.

Nash

Typical high production single-purpose machine line is found at Nash. In looking over the routing it may be noted that both ends of the rod are coined before machining. As is usual in a high production set-up, surface broaching plays an important role. The radius and joint face at the big end are broached in one setting on a Foote-Burt surface broaching machine. Another machine of this type is used for broaching the locating spot on each end; also the cam clearance.

Several Davis & Thompson machines are employed—one for drilling the bolt holes in caps and rods; the other for rough and finish reaming the big end and chamfering both sides of the big end after assembly. The wrist pin bushing is pressed in, chamfered, burnished, then diamond-bored on a Heald Borematic after assembly.

Great pains are taken to assure cleanness and freedom from chips and dirt. Several operations will be noted in which the holes are blown out to remove chips, one of these following the final degreasing in a Detroit Degreaser.

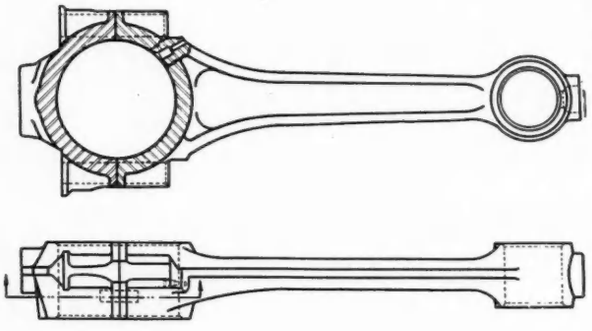
Rods are selected in matched sets with a maximum variation of 1/16 of an ounce between rods in each set.

Continental

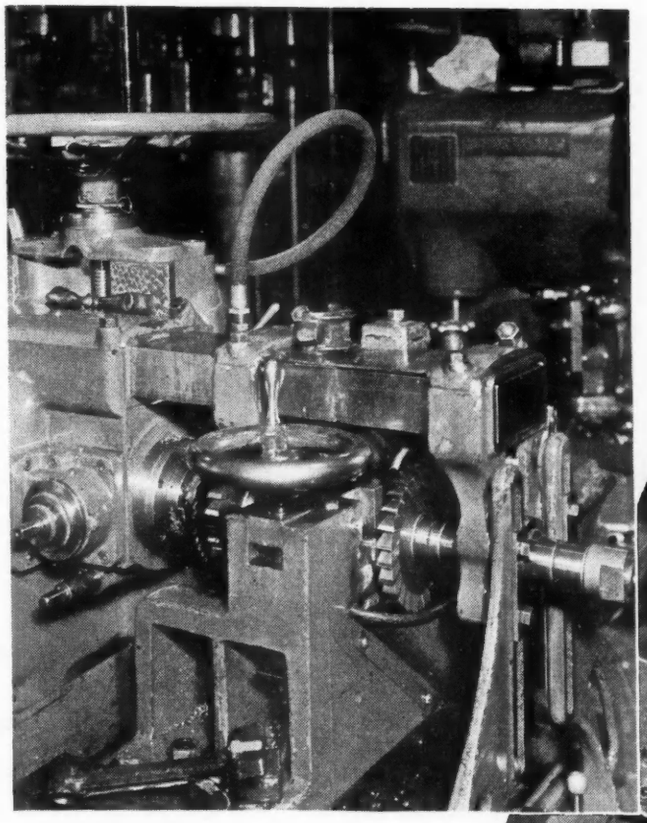
The manufacturing situation of commercial engine builders who are confronted with the problem of multiple-lot production is well exemplified in the routing of the Continental connecting rod. The machine line presents an array of universal type of equipment suitable for handling a variety of different rods through the same department. For best economy, consistent with great flexibility, a great deal of skill is re-

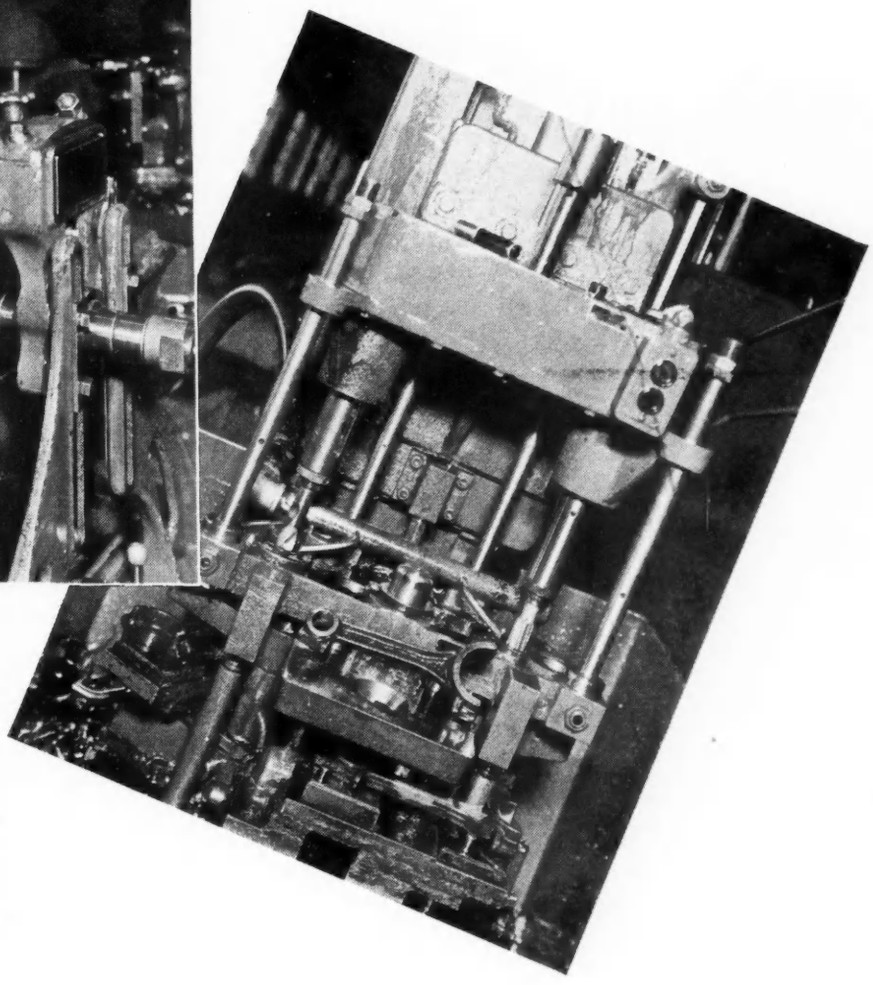
Continental Factory Routing

Connecting Rod



OPERATION	EQUIPMENT
Rough inspect for length	Bench
Drill hole for piston pin bushing	Foote-Burt gang driller
Chamfer both sides of small end	Cincinnati upright drill
Drill ¼ in oil hole	Leland-Gifford speed drill
Rough ream small end of piston pin bushing hole	18 in. Cincinnati drill press
Rough mill locating lugs to 3⅛ in. width	Kent-Owens hand miller
Mill locating side pads	24 in. Cincinnati automatic miller
Rough bore large end	Colburn gang drill
Drill bolt holes, four rods at a time	Natco multiple drill
Ream bolt holes	Leland-Gifford drill press with 2-spindle head
Mill nut seats and saw off cap	24 in. Cincinnati duplex mill with special fixture holding four rods
Remill liner contacts	No. 3 Cincinnati mill
Mill bearing lock slots	Kent-Owens hand miller with special fixture
Drill ⅛ in. angle oil hole	Leland-Gifford drill press
Countersink ⅛ in. angle oil hole and bolt holes	Leland-Gifford drill press
Wash	Special tanks
Assemble cap to rod	
Surface grind one side of large end	Blanchard grinder
Grind opposite side of large end	Blanchard grinder
Finish bore large end	24 in. Cincinnati drill
Chamfer both sides, large end	21 in. Cincinnati upright drill press
Drill 1/16 in. angle oil hole	Leland-Gifford drill press
Finish ream wrist pin hole	Cincinnati upright drill press using a special Barber-Colman reamer
Grind large hole to size	Heald Internal Sizematic grinder
Lap large end	24 in. Cincinnati drill press with Hutto lapping tools
Press in piston pin bushing	Heald diamond boring machine
Diamond bore piston pin hole	Hannifin air press
Inspect	





At the left is a Sundstrand Rigidmill straddle-milling pads on Allis-Chalmers connecting rods in their No. 3 plant. The view below shows a Natco drilling machine in the same plant for drilling and reaming the wrist pin end

quired in the design of interchangeable fixtures and tool setting, coupled with the use of skilled operators.

This is a one-piece forging but the cap is not sawed off until many of the major preparatory operations have been completed. First important operation is that of drilling the hole for the wrist pin bushing, serving as the location for succeeding steps.

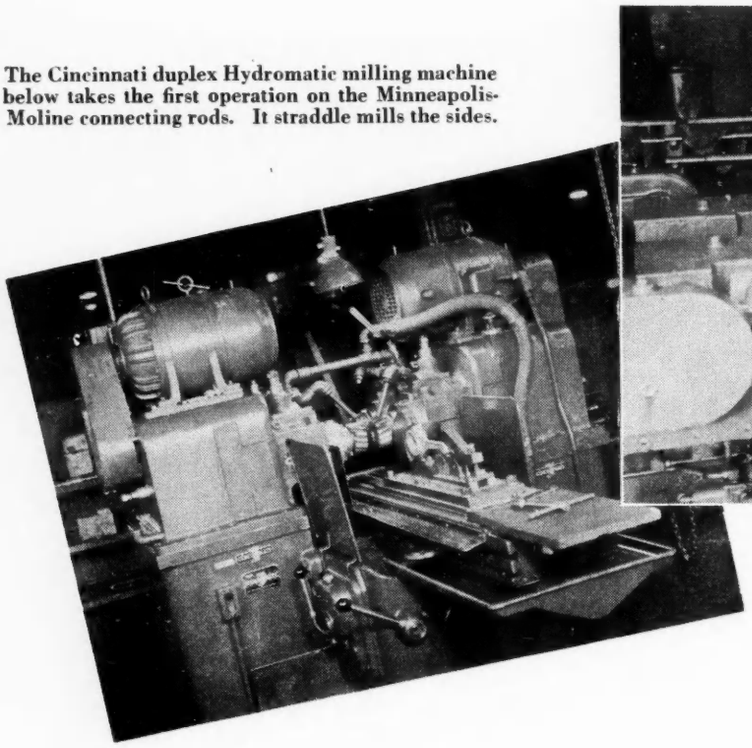
The crank bore is given painstaking attention. It is rough-bored, finish-bored, ground on a Heald Size-

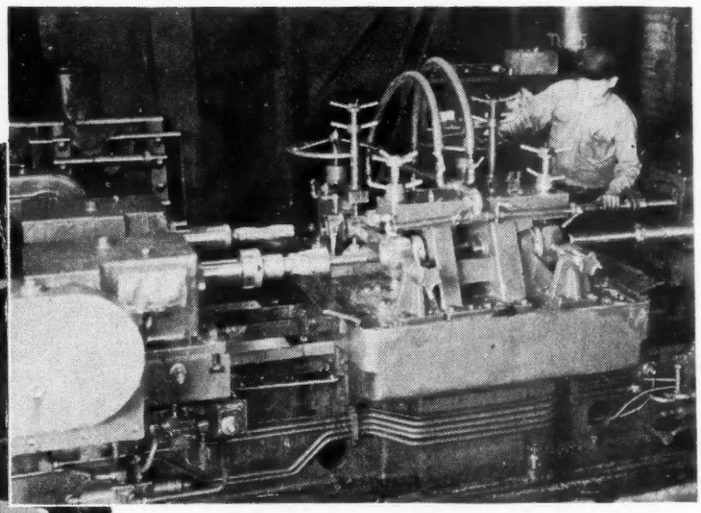
Routing Allis-Chalmers Factory

Connecting Rod—Model "WC" Engine

OPERATION	EQUIPMENT	OPERATION	EQUIPMENT
Drill and ream pin end	Natco driller — 3-station fixture	Grind burrs on cap and rod	Bench
Mill locating pad on cap and rod, mill slot and face for bolt on pin end	No. 1 Sundstrand Rigidmill	Assemble cap, shims, bolts, and nuts to rod	Bench
Mill joint faces on cap and rod	No. 3A Sundstrand milling machine	Straighten	Bench
Mill faces for bolt head-large end	No. 2 Producto hand milling machine	Bore, ream, face and chamfer large end	Natco multiple spindle machine
Drill, chamfer and ream bolt holes, cap and rod	Natco multiple spindle driller	Diamond bore crank and pin holes	Ex - Cell - O two - spindle machine
Spotface cap and countersink bolt holes in rod and wrist pin hole	No. 2 Allen single spindle drill press	Remove cap	Bench
Drill and tap for pinch bolt	Natco two-spindle drill and tap machine	Mill bearing lock groove in cap and rod	No. 1 U. S. hand milling machine
		Assemble cap to rod	Bench
		Saw slot through wrist pin end and file burrs	Bench
		Wash	Blakeslee washing machine

The Cincinnati duplex Hydromatic milling machine below takes the first operation on the Minneapolis-Moline connecting rods. It straddle mills the sides.





Above is an Ingersoll four-way machine used at the Minneapolis-Moline plant to rough and finish bore both ends of the connecting rods at one setting

matic, and honed with a Hutto hone. The wrist pin end is reamed to take the bushing, then the bushing is diamond-bored on a Heald precision boring machine after pressing in.

Finished rods are selected in sets, the variation in weight being not more than ¼ ounce in any engine.

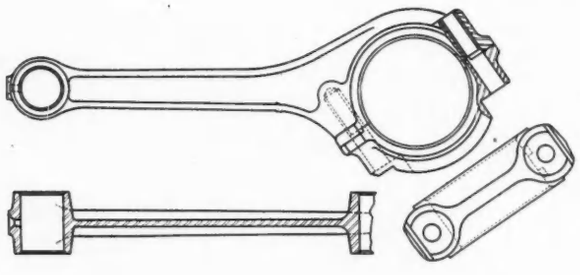
Allis-Chalmers

Excellent example of the tight self-contained production departments worked out in the process of building the new Allis-Chalmers tractor plant, which was described in this series some time ago, is the machine line for the Model "WC" engine connecting rod. Despite the modest volume of production as compared with passenger car activity, this department boasts the very latest unit-type equipment. Such equipment permits of favorable cost economy and yet is capable of seasonal change-over to accommodate product changes to any degree.

The rod is a two-piece forging, the cap being forged separately. Both the rod and cap are processed si-

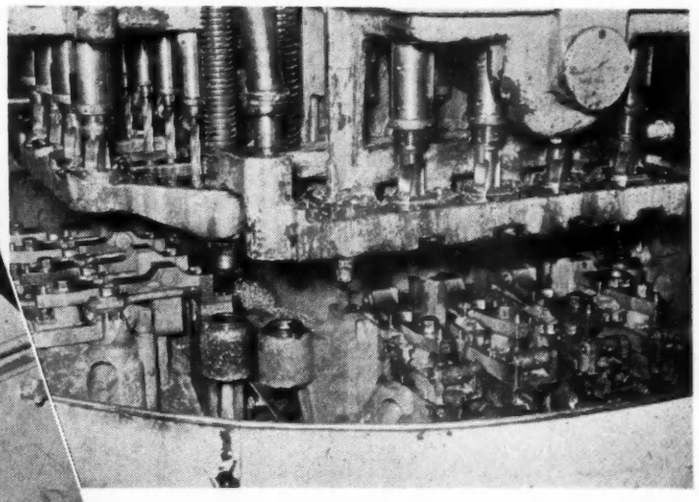
Minneapolis-Moline Factory Routing

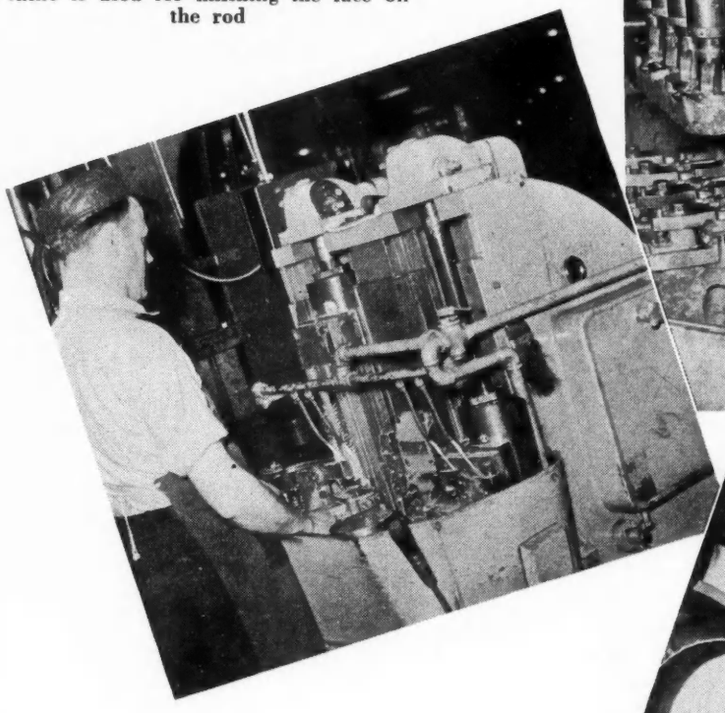
Connecting Rod



OPERATION	EQUIPMENT
Purchase forging normalized and pickle descaled (cap forged on)	
Straddle mill sides, check straightness, and file burrs	Cincinnati duplex hydromatic mill
Split cap and rod and file burrs (2 at a time)	Cincinnati No. 3 plain mill
Mill step fit on rod and file burrs	Cincinnati No. 3 plain mill
Mill step fit and locating pads on cap	Cincinnati No. 3 plain mill
Drill rod and cap (2 at a time)	Natco multiple drill
Countersink and tap rod	Barnes Drill Co. 20 in. post drill
Spotface cap	Barnes Drill Co. 20 in. post drill
File burrs, wash and assemble rod and cap	Bench
Center small end	Leland-Gifford speed drill
Rough and finish bore both ends	Ingersoll 4-way machine
Chamfer bores on both sides	Barnes Drill Co. 20 in. post drill
Broach small end for bushing	Oilgear No. 3 hydraulic broach
Press in bushing	Arbor press
Broach and burnish bushing	Oilgear No. 3 hydraulic broach
Loosen cap bolts	Bench
Remove bolts, mill slots in rod and cap for precision shells, and reassemble mating parts	U. S. hand mill
Bolt up cap and rod	Bench
Finish grind both sides	Blanchard surface grinder
Finish grind large end bore	Heald gagematic grinder
Wash and clean	Bench

Twin ram Colonial surface broaching machine at Buick for finishing contact face of caps. A similar LaPointe machine is used for finishing the face on the rod



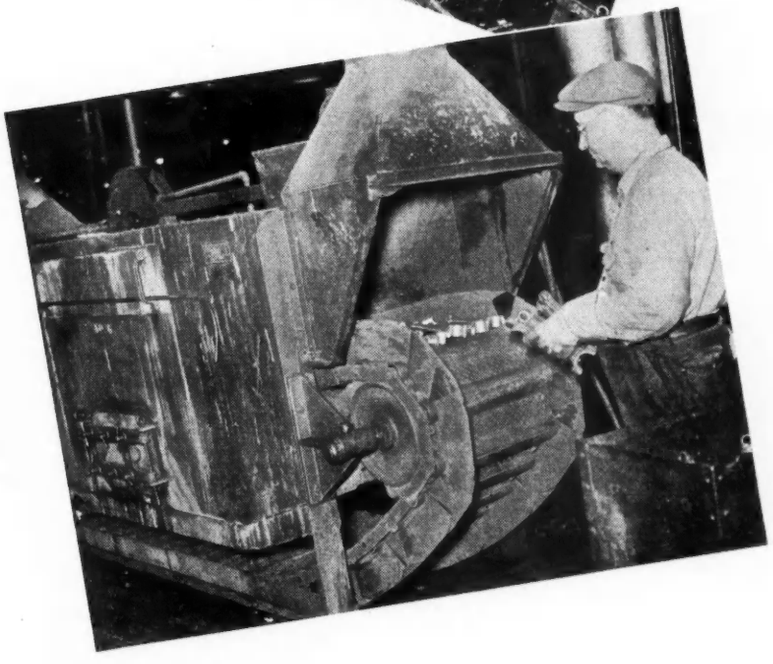


multaneously, the fixtures and tooling being designed to produce both parts in uniform sets. As will be noted in the routing, the first operation takes the drilling and reaming of the pin end while the second operation mills the locating pads. It is of interest that both the crank and pin bores are diamond-bored on a two-spindle Ex-Cell-O precision boring machine.

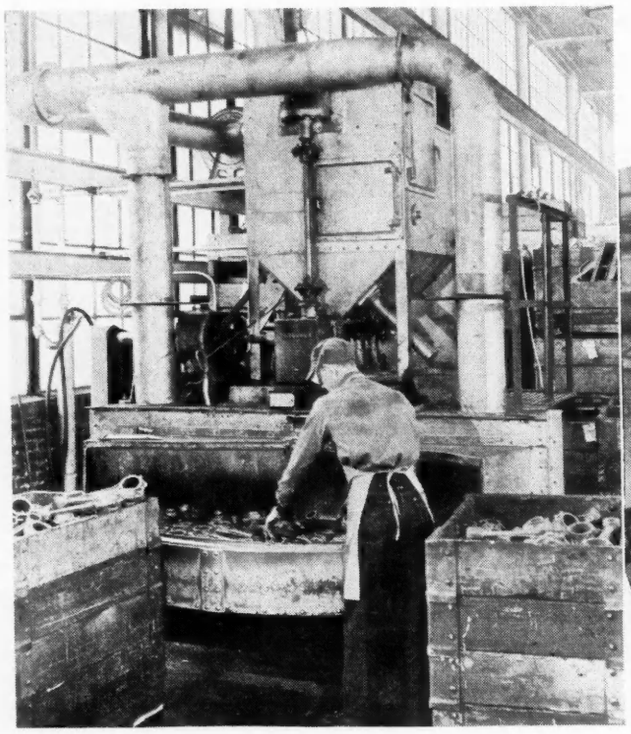
Pistons are machined to a common weight. Connecting rod and piston assemblies are matched to a weight of not more than one ounce variation per set of four.

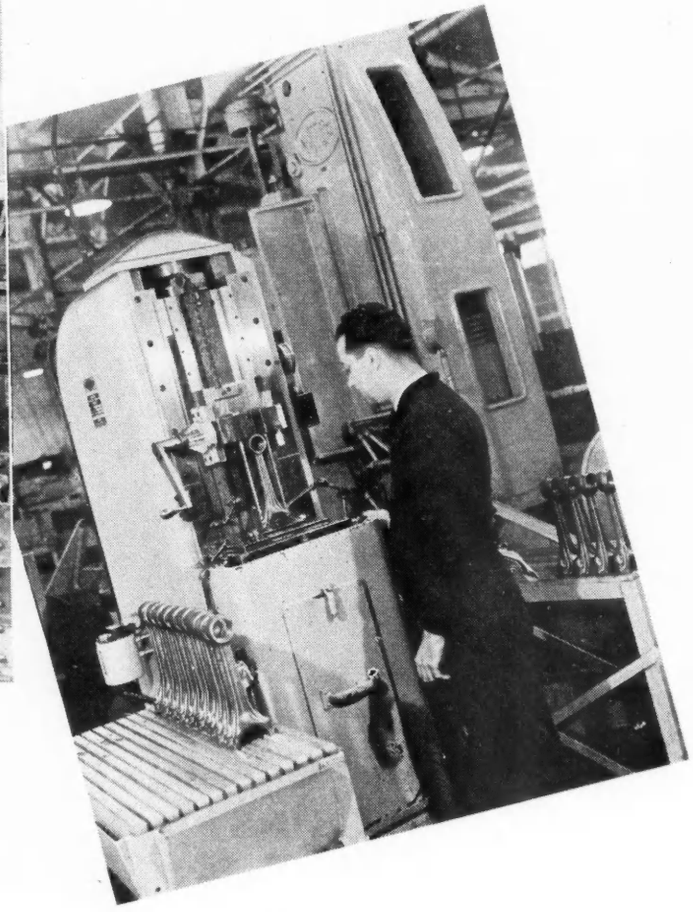
Minneapolis-Moline

Another example of flexible layout for multiple-lot production is offered by this tractor manufacturer. Reli-



The three views at the right, taken on the connecting rod production line at the Buick plant from top to bottom show—1. Close-up of work station of multiple-spindle Greenlee machine set-up for drilling and reaming both ends of the rod. Successive stations of the same machine tooled for milling the back of the bolt bosses, bolt heads, lock seats and cutting off the caps. 2. Battery of two-spindle Natco machines set up to face and chamfer face of finished connecting rod assemblies. 3. Loading connecting rod into a Blakeslee Niagara washing machine

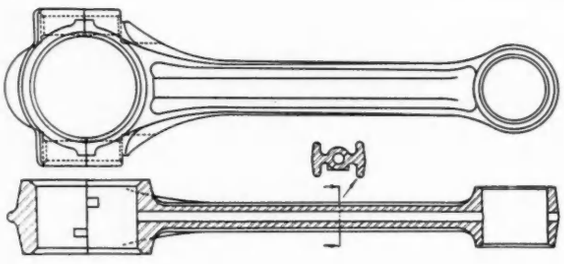




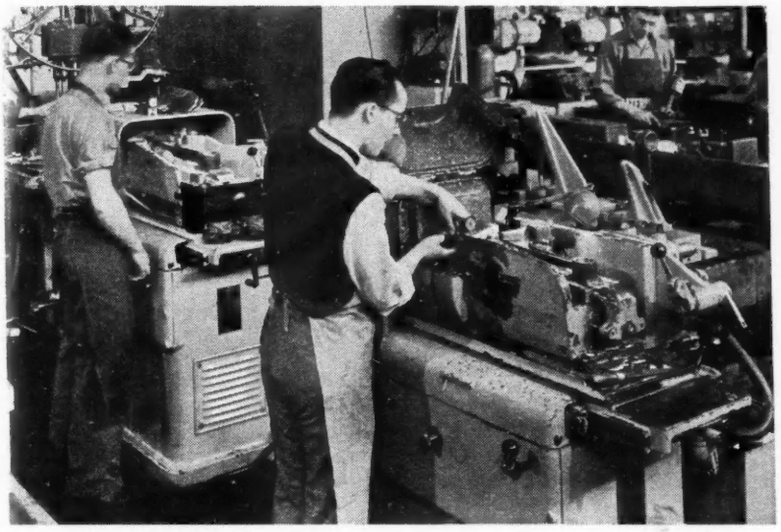
In the view above Caterpillar connecting rod forgings are prepared for the machine shop by sand blasting on this modern Pangborn machine. At the right bolt holes on the Caterpillar precision rods are being broached on an American broaching machine

Buda Factory Routing

Connecting Rod



OPERATION	EQUIPMENT
Inspect and check weights	
Straddle mill both ends	Cincinnati Hydromatic Mill
Grind both ends one side	Blanchard Grinder
Drill pin hole	Foote - Burt six spindle drill
Broach pin hole	American vertical hydraulic broach
Mill locating bosses each side crank end	18 in. Cincinnati automatic mill
Bore and elongate bore crank end	Foote-Burt six spindle drill
Drill and ream bolt holes	Natco multiple spindle drill
Split mill cap from rod and mill bolt lock	Cincinnati hydromatic mill
Drill oil line through rod	Leland-Gifford four spindle deep hole driller
Spotface bolt holes, rod and cap	Avey two spindle drill
Grind rod and cap for contact	Gardner disc grinder
Mill precision bearing lock	Hand mill
Chamfer bolt holes, rod and cap	Avey two spindle drill
Assemble rod and cap	
Grind crank end both sides	Blanchard grinder
Semi-finish bore crank end	Rockford single spindle drill
Chamfer crank end both sides	Rockford single spindle drill
Precision bore pin and crank end	Ex-Cell-O Precision two spindle boring machine
Disassemble rod and cap and assemble precision bearings	
Press in bushing	Arbor press
Drill and assemble dowel pin	Avey two spindle drill
Single blade ream	Single spindle Rockford drill press
Diamond bore bronze bushing pin end	Coulter two spindle diamond boring machine
Inspect	



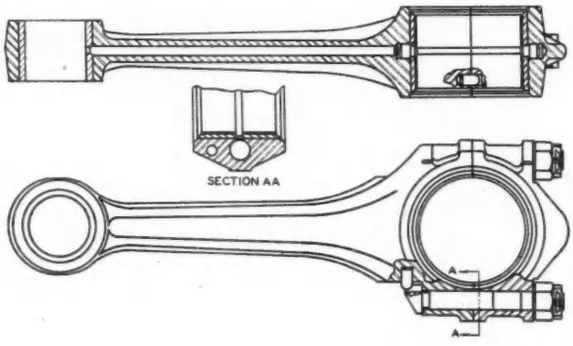
After broaching, the Caterpillar precision rods for Diesel engines are diamond bored on this battery of Heald precision boring machines

ance is placed upon flexibility of universal equipment in producing, economically, a wide variety of product.

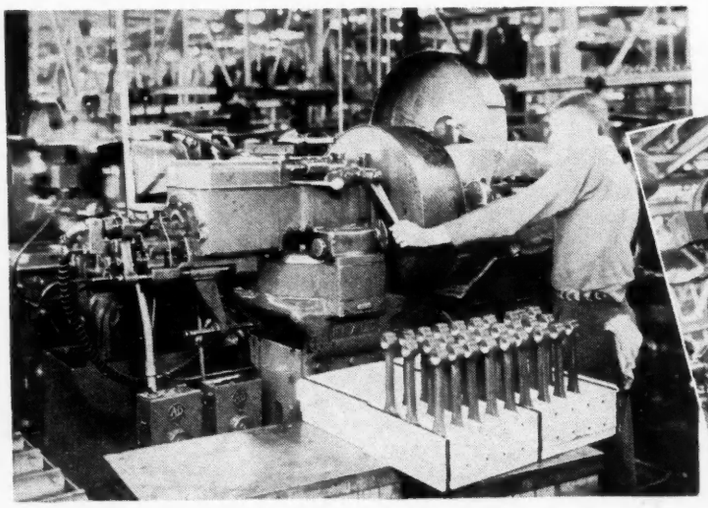
The MM rod is a one-piece forging, the cap being split diagonally on a Cincinnati milling machine in the second operation. A four-way Ingersoll is used for rough and finish boring the crank and wrist pin ends. A bushing is pressed into the small end and burnished to seat it firmly, after which the wrist pin

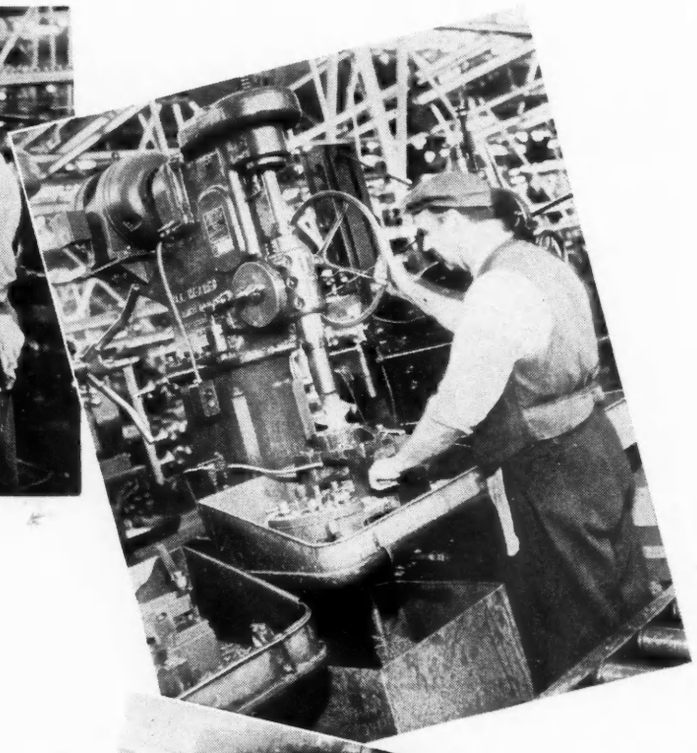
Caterpillar Factory Routing

Connecting Rod



OPERATION	EQUIPMENT
Sandblast	90 in. Pangborn rotary sandblast
Finish mill sides of pin bearing end and rough mill sides of crank bearing end	48 in. Cincinnati automatic duplex mill
Mill locating pad on cap end of rod and mill spot on pin bearing end	No. 1 U. S. improved hand mill
Straddle mill flats on bolt lugs	48 in. Cincinnati automatic duplex mill
Mill nut seat on cap end of rod and saw cap from rod	No. 4—36 Cincinnati plain horizontal mill
Drill and rough ream bolt holes	No. C16H Natco 26 in. round head multiple drill (12-spindle)
Rough grind joint face on rod	No. 141 Besley grinder
Rough grind joint face on cap	No. 141 Besley grinder
Counterbore bolt holes in rod for bolt head	No. 2 Colburn heavy duty drill
Drill and ream lock pin holes in rod for bolts	Special Caterpillar design
Finish ream bolt holes in rod	No. 3 Aveymatic single spindle drill
Finish ream bolt boles in cap	No. 3 Aveymatic single spindle drill
Assemble 2 pins in rod for bolt lock. Assemble cap and rod together with manufacturing bolts and nuts	Bench
Drill and ream dowel hole bearing hole; drill and rough ream crank bearing holes and chamfer pin bearing hole	Special Caterpillar design 6-spindle rotary drill
Disassemble	Bench
Drill and ream dowel hole in joint face of rod	14 in. Allen sensitive drill (2-spindle)
Drill dowel holes in joint face of cap	14 in. Allen sensitive drill (2-spindle)
Finish grind joint face of cap	No. 141 Besley grinder
Grind sides of cap	No. 84 Gardner double spindle grinder
Grind sides of rod	No. 84 Gardner double spindle grinder
Finish grind joint face of rod	No. 141 Besley grinder
Counterbore relief in bolt holes at nut seat on cap	No. 2 Avey high speed drill (single-spindle)
Counterbore relief in bolt holes at bolt head seat on rod	No. 2 Avey high speed drill (single-spindle)
Bore bolt holes in rod	No. 48A Heald Borematic (special)
Bore bolt holes in cap	No. 48 Heald Borematic (special)
Broach bolt holes in rod	T-4-24 American vertical 3-way hydraulic broach
Broach bolt holes in cap	T-4-24 American vertical 3-way hydraulic broach
Assemble (1) pin in rod; assemble rod and cap together with production bolts and nuts	Bench
Chamfer both sides of crank bearing hole	No. 25 — 24 Foote-Burt single spindle heavy duty drill
Semi-finish bore crank bearing hole and finish bore wrist pin bushing hole	No. 47 Heald Borematic (special)
Press in bushing	10-ton Oilgear hydraulic press
Finish bore crank bearing hole and bushing in pin end	No. 47A Heald Borematic (special)
Disassemble	Bench
Drill, ream and counterbore dowel hole in crank bearing end of rod and cap	No. 2 Avey sensitive drill (single spindle)
Drill oil hole through rod to bushing	No. 2 Leland-Gifford 20 in. oil hole drilling machine (4-spindle)
Remove burrs	Bench
Assemble dowels and bearing in rod and cap. Assemble cap and rod together with bolts and nuts	Bench



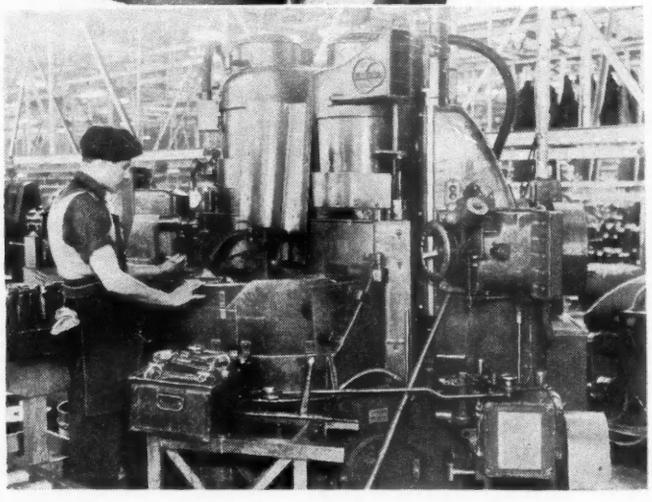


bore is finished with a combination broach and burnishing tool. The last operation is the finish grinding of the crank bore for precision bearing shells on a Heald Gagematic internal grinder. Rods are matched to 0.6 ounces in sets for assembly.

Buda

A connecting rod line tooled for low cost production on 24 different forgings is Buda's contribution to universal tooling for precision manufacture. Increased demand on the seven different precision rods for current engines was responsible for the installation of several new machines in this department. Among the new machines are the following items: a No. 223 Gardner disk grinder for finishing cap and rod contact faces; a Leland-Gifford 4-spindle step drilling machine for the oil line through the rod; and an Ex-Cell-O 2-spindle precision boring machine for finishing the crank and pin end simultaneously.

As will be seen in the routing, the equipment in the connecting rod line is more or less of universal type capable of quick change-over for any



The group of pictures on this page were taken at the Chrysler plant of operations in the machining of connecting rods. The upper left view shows a Heald Gagematic grinding machine for finish grinding of the crank end bore. The upper right illustration is of equipment from the Barnes Drill Co. and used for drilling and reaming the crank end bore. The second view down on the right is a multiple-spindle Davis Rotomatic for drilling the wrist pin hole while the lower view is of a Blanchard rotary surface grinder. This machine is used for grinding the sides of the crank end at the rate of 360 pieces per hour

style of forging. A system of interchangeable fixtures takes care of the accurate positioning of the different rods on each of the machines.

Rods are machined to a close weight tolerance and are selected in matched sets for each engine.

Buick

Here is a straight line, high production set-up featuring a multiplicity of operations inherent in a minute subdivision of functions on the machine line. Buick was one of the very first organizations in the industry to use a separate booth for the inspection and assembly of rod and piston sets. The enclosed booth is temperature controlled so as to permit the development of these basic functions under standard temperature conditions.

Interesting feature of the set-up is the fact that piston sets are made up selectively according to size to suit the bore diameters of each engine going over the assembly line. Cylinder bore sizes for each engine are teletyped to the booth from the assembly inspection station, constituting the schedule of rod assemblies in the booth.

While we have not reproduced the routing of the Buick rod machining, we are able to high spot some of the more important operations. In the first place, the one-piece forgings are coined at both ends on a 600-ton Hamilton press before machining. One of the most interesting of the machines in this department, which was developed by Buick in cooperation with the machine tool builder, is a huge Greenlee vertical center column hydraulic indexing unit which performs a variety of operations. In one setting, the machine drills and reams the wrist pin hole, drills and reams the crank pin bore, mills the back of bolt bosses, bolt heads, and lock seats, cuts off the cap.

A LaPointe broaching machine is used for surface broaching the locating pads on the rod. The wrist pin hole is broached on an American vertical broaching machine. After the preliminary drilling and tapping operations, the rod is cleaned in a Niagara washer and proceeds to the babbitting station.

The cap is processed separately, the most unique operation being the surface broaching of locating pads in an American rotary continuous broaching machine. The caps are cleaned in a Niagara washing machine and meet the rods at the babbitting station.

After babbitting, the rod and cap are assembled for the final finishing operations on the wrist pin hole and crank bore. Major items of equipment for the final stages consist of Cincinnati drill presses, Natco drilling machines, and a variety of miscellaneous machines. The crank pin hole takes two rough reaming operations, then a finish ream on a special hand machine.

Chrysler

The Chrysler rod is a two-piece forging. It is tooled for high production, taking advantage of the most modern equipment. Feature of the set-up is the arrangement for automatic sorting according to weight of rough forgings, machining to common weight by an ingenious quick-adjustable fixture on the surface broaching machine. This organization has made the most of the advantages of surface broaching.

First of the surface broaching operations takes place on a Cincinnati vertical hydraulic Duplex broaching machine, broaching the sides of the crank bore. This provides working surfaces for locating on the second operation Cincinnati broaching machine which handles the broaching

of the half bore and parting face. Rods and caps are finished in pairs, rods being held in a fixture on one side of the table. Interesting feature of each fixture is a nicely calibrated screw-operating mechanism with a large dial graduated in grams so that the amount of metal removal can be adjusted by the operator in accordance with the previous weighing operation.

Particular attention is given to the finishing of the crank and pin bores. After broaching, the crank bore is reamed, ground, and honed. The pin hole is drilled, rough-reamed, finish-reamed. The bushing is burnished after pressing in, finally diamond bored.

Rods are finished to a common weight of plus or minus 2 grams.

Caterpillar

Feature of the "Caterpillar" connecting rod machine line is the tooling for producing the special "precision" Diesel engine rod. According to recent "Caterpillar" research, it has been found essential to take extraordinary precautions to assure perfect alignment of the rod and cap bore so as to properly retain the precision bearing under heavy-duty operating conditions. This alignment is found to hold the secret of good journal lubrication and long bearing life.

The machine line has been developed about this cardinal principle. Examination of the routing will show that the line has been provided with a variety of flexible universal type equipment most suitable for moderate volume of production, capable of quick change-over.

The rod is a one-piece forging, the cap being sawed off in the fourth operation. All rods are heat treated and checked 100 per cent for hardness before machining. Among the more or less unusual operations required to produce the precision rod are those concerned with the finishing of the bolt holes. These are first drilled and rough-reamed, then finish-reamed. Following preparatory machining operations, the bolt holes are diamond-bored, separately in rods and caps, on Heald Borematics. Then the bored holes are broached, separately, to produce a burnished finish.

At this point the cap and rod are assembled, both crank bore and wrist pin hole diamond-bored as a semi-finish operation on a Heald Borematic. The bushing then is pressed in and both the crank bore and bushing are diamond-bored. Finally, the dowel hole in the crank bearing end is drilled, reamed, and counterbored to assure alignment.

Plymouth

This is a two-piece forging, tooled for mass production. In fact, at the time this article was being written, the department was scheduled to produce 16,875 rods per day. The equipment includes many items of unit-type production machinery and features an unusual array of broaching equipment both for surface broaching and hole broaching.

Unique is the fact that the entire connecting rod department is housed in a separate glass-enclosed unit. Here the roughing operations are separated from finishing operations by a tight partition. To further assure perfection of final operations, the finishing section has conditioned air and controlled temperature.

Among the more interesting of the surface broaching machines are the two vertical hydraulic Duplex machines tooled for broaching the joint face and caps bore half. One battery of machines handles the rods, the other battery takes caps only. The broaching tools for both machines

are alike. Each is made up of three major sections—the first section for rough broaching the joint face; the second for broaching the half bore; the third for finishing the joint face.

The crank end is broached after assembly, then honed on a single-spindle honing machine fitted with a special fixture accommodating three rods at a time. The wrist pin bushing is burnished on a hole broaching machine after pressing in place, then is diamond-bored.

Rods are weighed and selected in groups with a total variation of 4 grams between groups.

Summary

It has been our intention in this article to let the routing forms speak for themselves, since the complete detail of the set-up for each make of rod is given in briefed but comprehensive form.

The tabular material, supplemented by carefully chosen illustrations will give the production man much valuable information as to the best current practice in establishments representing a complete cross-section of engine building in this country. These data are of practical value in several respects. First, they permit the factory executive to compare his own practice with that of leading plants whose problems may be quite analagous. In addition, this survey should be of value to organizations who are in the process of improving their present set-up or contemplating an entirely new building program.

In fact, the latter consideration was largely instrumental for the preparation of this survey as we have learned on several occasions that new building programs had profited by the routings and process data contained in the current production series. We feel now that we can provide a still better service for our readers by concentrating the connecting rod data within a single article, thus facilitating ready reference.

India Being Industrialized

ACCORDING to a report on Conditions and Prospects of United Kingdom Trade in India, the latter country is becoming industrialized quite rapidly. The Tata Steel Works last year turned out 660,000 tons of steel, and another steel works, in Bengal, will shortly start production, with the prospect that between them they will be able to supply the country's needs for all but special steels. A scheme is under consideration for manufacturing passenger cars and trucks in a plant near Bombay, which will begin operations as an assembling plant. Automobile tires already are being produced successfully in a Bombay suburb, and tire imports have begun to be affected. Production of simple machine tools has begun, and schemes for the organization of manufacturing industries for light machines, such as bicycles and sewing machines, are going forward.

A new bill regulating motor vehicle registration and licensing is expected to help road transport greatly. Heretofore the rules have varied from province to province. This bill also will control commercial road transport and provide for third-party compulsory insurance. The latter is said to have proved necessary because India has the highest rate of motor vehicle accidents in the world. A road fund, inaugurated in 1929, has reached 36 million dollars, of which 78 per cent had been allocated to provincial governments by September, 1937. So far most of the money has been spent in the vicinity of Bombay, but ambitious schemes are on the boards in most of the provinces, including that of a through road from Bombay to Calcutta.

A New Apparatus for Measuring Blowby

IN the past commercial gas meters have been used to quite an extent for the measurement of the rate of blowby into the crankcases of internal-combustion engines, but these have the disadvantage that their materials are attacked by some of the products of combustion, and the meters often become defective after only 20 hours of operation. A new apparatus developed by the German Research Laboratory for Aviation makes use of the pressure difference on opposite sides of an orifice plate which is inserted into the breather of the crankcase. The pressure difference is measured by means of an apparatus also developed by the laboratory which converts the pressure variations into electrical impulses, and the momentary value of the electric current can be measured by means of a milli-voltmeter or can be recorded with the aid of a thermo-recorder. The orifice-plate holder is so arranged that orifice plates can be readily interchanged. If a small orifice is used the pressure difference will be higher and the sensitivity of the apparatus will be increased. Orifice plates are of aluminum alloy and anodized, which makes them immune from attack by exhaust gases. All hose connections are of synthetic rubber, also to prevent attack by the gases.

Measurement of the pressure difference on opposite sides of the orifice plate is effected by means of a pressure gage of the inclined-tube type which is filled with mercury. To make the instrument more compact, the "inclined tube" is arranged in helix form, as shown in Fig. 1. Within the tube there is a thin current-carrying wire which forms one leg of a Wheatstone bridge. More or less of the wire will be submerged in mercury, according to the pressure of the gas, and the resistance of the wire varies in proportion. The higher the mercury column in the glass tube, the smaller the resistance of the wire, and the greater the unbalance of the Wheatstone bridge. Therefore, the current flowing through the indicator of the Wheatstone bridge is directly proportional to the height of the mercury column and therefore to the pressure difference. In Fig. 2 are shown the electrical circuits of the apparatus.

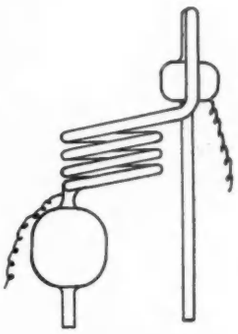


Fig. 1—Inclined (helical) tube mercury pressure gage

The resistances of the four legs of the "bridge" are so proportioned that when there is no pressure difference on opposite sides of the orifice plate no current flows through the milliameter. If the ammeter should not show exactly zero when there is no pressure on the mercury column, it can be brought to zero by means of the variable resistance B. The sensitivity of the apparatus can be changed by means of resistance C. If the instrument is too sensitive, it may happen that the meter hand passes over the whole scale even though the helical tube is only half filled with mercury. In that case the bridge can be balanced again by cut-

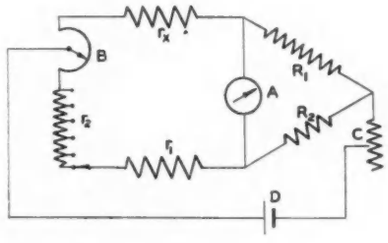


Fig. 2—Wheatstone bridge circuit used with pressure gage.

(A, ammeter; B, resistance for zero-point correction; C, loading resistance; r_2, stepped resistance for shifting the zero point; r_x, resistance in the helical glass tube; R_1, R_2, r_1, Wheatstone-bridge resistances; D, source of current.)

ting out one or more sections of the resistance r_2.

This apparatus was specially developed to permit of studying the performance of piston rings in aircraft engines. Freezing of rings is indicated by a rapid increase in the rate of blowby.—*A.T.Z.*, December 10.

Raw Materials In Industrial Germany

AT the annual meeting of the committee on economic policy of the National Socialist party in Germany, which opened in Munich on Jan. 23, Major-General von Hannecken spoke on the subject of government control of raw materials under the four-year plan. Referring to the working of low-grade iron-ore deposits, he said 15,000,000 tons had been mined last year, and 4,000,000 tons of pig iron produced therefrom. Light alloys, of which Germany can produce unlimited amounts from native minerals, are being substituted for ferrous material wherever practical, and especially in the production of motor vehicles. He said the supply of lubricating oil produced synthetically from lignite and coal now almost measured up to the national requirements. The production of Buna rubber increased greatly during the past year, and whereas tires produced from such rubber heretofore had been restricted to use on army vehicles, they would be fitted also to private passenger cars hereafter.

Neoprene-Gas Resistant

Tests made at the National Bureau of Standards for the Bureau of Aeronautics, U. S. Navy Department, have shown that at 77 deg. Fahr. neoprene has a permeability to gases which is only about one-fifth or one-sixth that of a rubber film of equal thickness. The presence of cloth was found to add to the impedence to gas in neoprene-coated fabrics to the same extent as with rubber-coated fabrics. A supplementary coating of paraffine on the fabric lowers the permeability decidedly. Toluol appears to be the most satisfactory solvent for coatings, as highly volatile solvents tend to leave pinholes.

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"See, I told you it was too short—he distinctly said your skirt had too much clearance!"

MOTOR AGE, September, 1938 37

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